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IOWA STATE UNIVERSITY
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In cooperation with Iowa Agriculture and Home Economics Experiment Station and Cooperative Extension Service, Iowa State University, and Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship

Soil Survey of Cass County, Iowa

Part I

How To Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, the survey area is divided into groups of soils called associations. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the soil associations on the color-coded map legend, and then refer to the section **General Soil Map Units** in Part I for a general description of the soils in your area.

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets** in Part III. Note the number of the map sheet, and turn to that sheet. Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. The **Contents** in Part I lists the map units and shows the page where each map unit is described.

The **Contents** in Part II shows which table has information on a specific land use or soil property for each detailed soil map unit. Also, see the **Contents** in Part I and Part II for other sections of this publication that may address your specific needs.

National Cooperative Soil Survey

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey. This survey was made cooperatively by the Natural Resources Conservation Service; the Iowa Agriculture and Home Economics Experiment Station and Cooperative Extension Service, Iowa State University; and the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship. The survey is part of the technical assistance furnished to the Cass County Soil and Water Conservation District.

Major fieldwork for this soil survey was completed in 2010. Soil names and descriptions were approved in 2010. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2010. The tables reflect the data in effect as of February 2011. The most current official data are available on the Internet (http://soils.usda.gov).

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover Photo Caption

Corn growing on an upland in an area of the Sharpsburg-Shelby association in Cass County, Iowa.

Additional information about the Nation’s natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

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Issued 2011

Foreword

Soil surveys contain information that affects land use planning in survey areas. They include predictions of soil behavior for selected land uses. The surveys highlight soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

Soil surveys are designed for many different users. Farmers, foresters, and agronomists can use the surveys to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the surveys to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the surveys to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each map unit is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

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Soil Survey of
Cass County, Iowa

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Fieldwork by Richard J. Bednarek, David M. Gundlach, Richard A. Lensch, Daniel J. Pulido, and Allan W. Younk, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the Iowa Agriculture and Home Economics Experiment Station and the Iowa Cooperative Extension Service, Iowa State University, and the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship

CASS COUNTY is in southwestern Iowa (fig. 1). It is in the third tier of counties north of the Iowa-Missouri State line. The county has an area of 361,700 acres, or about 565 square miles. Atlantic, the county seat, is approximately 75 miles southwest of Des Moines, Iowa.

This soil survey updates the survey of Cass County published in 1969 (Jury and others, 1969). It provides additional information and has larger maps, which show the soils in greater detail.

How This Survey Was Made

This survey was made to provide updated information about the soils and miscellaneous areas in the survey area, which is in Major Land Resource Areas 107B and 108D. Major land resource areas (MLRAs) are geographically associated land resource units that share a common land use, elevation, topography, climate, water, soils, and vegetation (USDA/NRCS, 2006). Cass County is a subset of MLRAs 107B, Iowa and Missouri Deep Loess Hills, and 108D, Illinois and Iowa Deep Loess and Drift, Western Part.

The information in this survey includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. During the fieldwork for this survey, soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug soil observation pits for the purpose of studying the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind or segment of the landscape. By observing the soils in

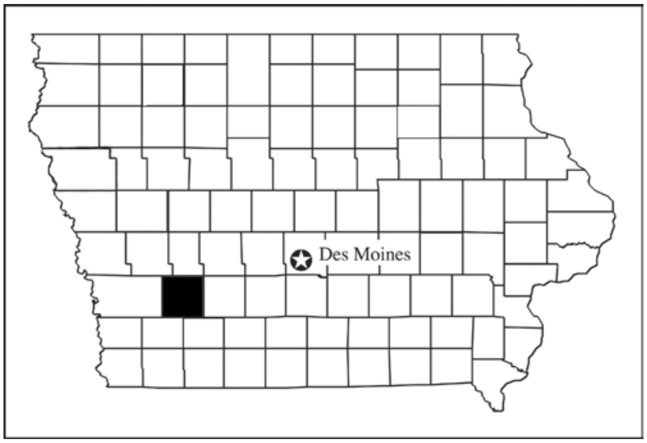

Figure 1.—Location of Cass County in Iowa.

the survey area and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. During mapping, this model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. The maximum depth of observation was about 80 inches (6.7 feet). The soil scientists noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, soil reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are collected for laboratory analyses and engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and soil properties to determine the expected behavior of the soils under different uses. Interpretations are field tested through the observation of the soils in different uses and under different levels of management. Interpretations are modified as necessary to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area may not fully agree with those of the soils in adjacent survey areas. Differences are the result of an improved knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Nature of the Survey Area

This section provides general information about the survey area. It describes history; industry, transportation facilities, and recreation; physiography and drainage; and climate.

History

Before settlement by people of European descent began in Cass County in 1838, the Pottawattamie tribe had encampments along many of the major streams. Their main settlement was west of the present town of Lewis (Tilton, 1916), where the Des Moines and Keokuk routes of the old Mormon Trail joined. Cass County was originally part of Keokuk County, which extended westward to the Missouri River.

Cass County was named in honor of Lewis Cass, a Michigan senator. The present boundaries of the county were established in 1851. On October 20, 1869, the city of Atlantic was declared the county seat.

Two noteworthy historical sites in Cass County are the Hitchcock House (fig. 2) and the Mormon Trail. The Hitchcock House, a sandstone house on a hill near Lewis,

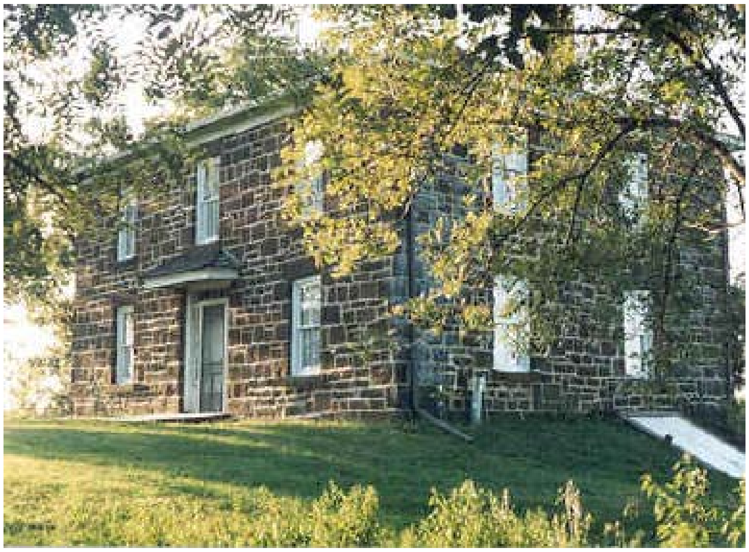

Figure 2.—The historic Hitchcock House in Lewis, Iowa. Photo courtesy of Hitchcock House Web site (http://www.hitchcockhouse.org/).

served as part of the Underground Railroad for runaway slaves during the Civil War. Remnants of the Mormon Trail along Seven Mile Creek are still visible today.

In 2010, the population of Cass County was 13,956 (U.S. Department of Commerce, 2010). Of this total, an estimated 6,777 lived in Atlantic, 1,135 lived in Anita, and 1,039 lived in Griswold. The estimated combined population of the towns of Cumberland, Lewis, Marne, Massena, and Wiota was 1,431. Most of the other people in the county lived on farms.

Industry, Transportation Facilities, and Recreation

Agriculture is the primary industry and the dominant land use in Cass County. Corn and soybean production and livestock operations have replaced prairie grasses. In 2009, cropland covered 257,900 acres, or 71 percent of the county (National Agricultural Statistics Service, 2009). The average farm size has been increasing over the years. In 1974, the average farm size was 284 acres; in 2009, the average farm size was 419 acres (National Agricultural Statistics Service, 2009). As farm size increases, the number of farms and the diversification of crops decrease. Principal cropland harvested represented 146,940 acres, or 54 percent of the land use in Cass County. Harvested corn and soybeans represented about 56 and 41 percent, respectively, of the total harvested cropland. The remaining 16 percent of the total harvested cropland included oats, wheat, alfalfa hay, and other hay crops. No-till practices are used on slightly less than half of the cropland (fig. 3); 123,000 acres of no-till corn and soybeans was produced in 2009. Farm animals marketed in 2002 included 69,000 hogs and pigs and 46,000 head of cattle (fig. 4). Other industries include manufacturing applications, educational services, medical and mental health

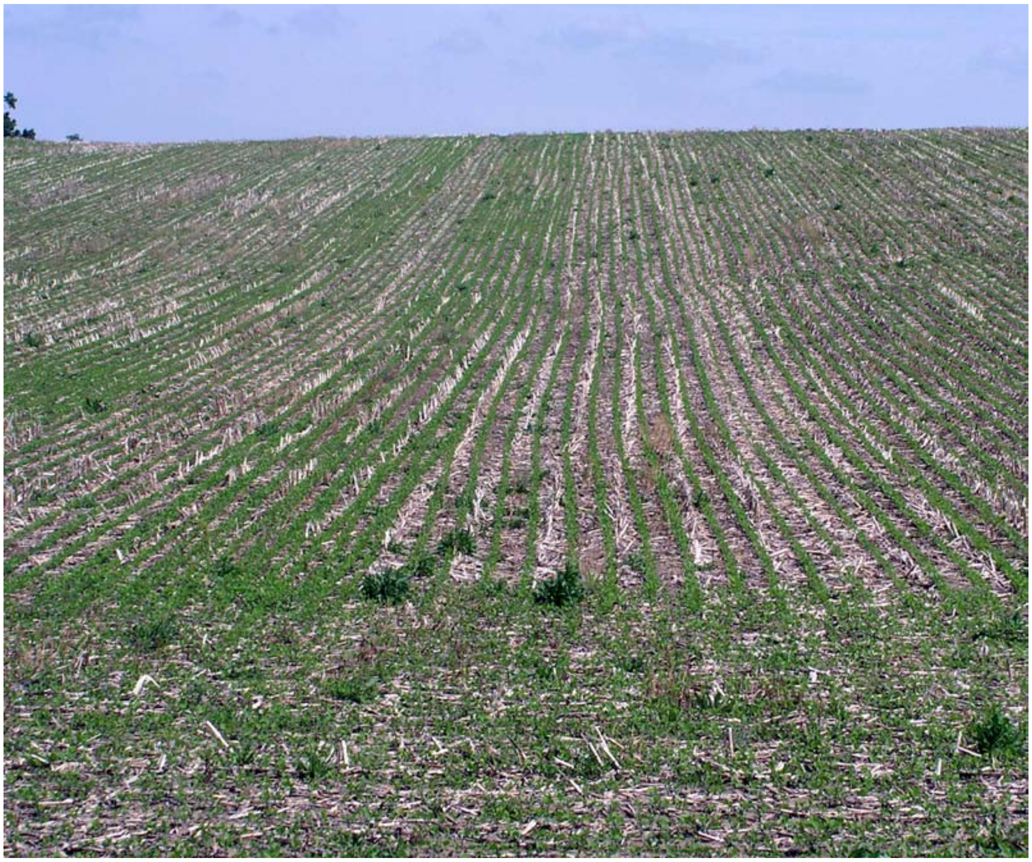

Figure 3.—Soybeans emerging in a no-till area in Cass County.

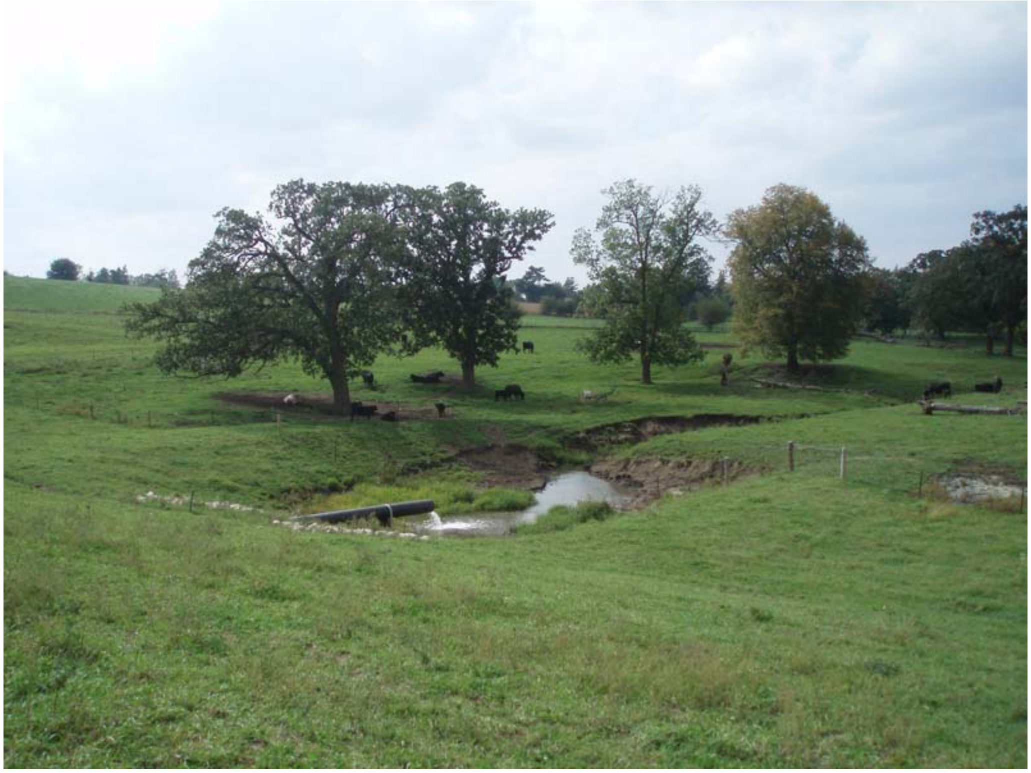

Figure 4.—Cattle grazing in Cass County, Iowa.

groups, and other service-oriented businesses. Mining and mineral resources are minimal.

Transportation facilities include highways, railroads, and an airport. Interstate 80 is about 7 miles north of Atlantic. State Highway 48 bisects the southwestern part of the county in a north-south direction. State Highway 6 crosses the northern part of the county from east to west. State Highway 148 is in the eastern part of the county. Freight is transported by truck or by railroad. The Atlantic Municipal Airport is 2 miles west of Atlantic.

Cass County has 624 acres of parks, wildlife areas, historic sites, and refuges. Conklin Fish Farm, Cold Springs Park, Frank Chapman Pellet Memorial Woods, Hitchcock Recreation Area, Nodaway Wildlife Area, Outdoor Educational Classroom, and West Nodaway Wildlife Area are among the recreational sites in the county. Lake Anita Park (fig. 5), the only State recreation park in the county, has a total of 1,062 acres, of which 171 acres is lake area (IACCB, 2010).

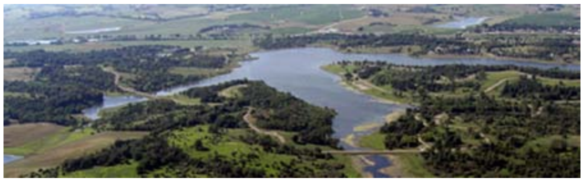

Figure 5.—An aerial view of Lake Anita. Photo courtesy of Friends of Lake Anita State Park Web site (http://www.lakeanitastatepark.org/index.htm).

Physiography and Drainage

The original topography of the soil survey was that of a glacial drift plain. The glacial drift plain was greatly modified by downcutting of streams and geologic erosion. The remnants of the plain now occupy a series of stable loess-covered divides that run throughout the county. These divides are gently sloping and moderately sloping in nearly all parts of the county and are less than one-eighth mile wide. In the eastern part of the survey area, the stable summits become flatter (nearly level and gently sloping) and are generally one-fourth to one-half mile wide. The divides are bordered by moderately sloping and strongly sloping loess-covered side slopes at the upper end of the drainageways.

Below the loess-covered summits are moderately sloping and strongly sloping areas of developed paleosols. Below the paleosols are strongly sloping and moderately steep areas of less developed glacial till soils. The nearly level and level flood plains range from one-eighth mile to 1$^1/_4$ miles wide.

The highest elevation in the survey area is 1,420 feet above sea level. It is in the northeastern part of the county, adjacent to Audubon County. The elevation of the upland divides decreases toward the southwest in the southern part of the county. The lowest elevation is about 1,080 feet above sea level at the point where the East Nishnabotna River enters Pottawattamie County just west of the town of Griswold. The smaller stream valleys are commonly 80 to 180 feet in elevation below the upland divides.

All of Cass County is in the Missouri River watershed. The eastern part of the county is drained by the West Nodaway River. The south-central part of the county is drained by Seven Mile Creek. The western part of the county is drained by the East Nishnabotna River. Streams flow generally in a south or southwesterly direction.

Water movement in soils varies depending on natural drainage properties. The loess soils of nearly level to moderately sloping upland divides are moderately well drained. The paleosols are poorly drained and somewhat poorly drained. Sidehill seeps occur between the moderately sloping loess soils and the paleosols. These seeps are caused by rainwater that infiltrates through the loess soils and perches at the point where the loess comes in contact with the less permeable paleosol. The perched water flows laterally until it reaches the point where the contact between loess and till is exposed at the surface. Installing interceptor tile in the loess soils slightly upslope from these wet, seeping areas helps to intercept and drain excess moisture.

The strongly sloping to steep soils that formed in glacial till are well drained. Soils on the flood plains range from poorly drained to well drained and are subject to flooding and ponding. Tile drainage systems may not function satisfactorily in some soils that have a slowly permeable subsoil. Generally, supplementing tile with a good surface drainage system is necessary to provide adequate drainage in these soils.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Atlantic, Iowa, in the period 1971 to 2000. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 22.8 degrees F and the average daily minimum temperature is 13.0 degrees. In summer, the average temperature is 72.4 degrees F and the average daily maximum temperature is 83.9 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 35 inches. Of this total, 25 inches, or 71 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 12 inches.

The average seasonal snowfall is 25.3 inches. On the average, 10 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

Table 1.--Temperature and Precipitation

(Recorded in the period 1971-2000 at Atlantic, Iowa)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	29.4	9.3	19.3	57	-24	3	0.84	0.36	1.26	2	6.4
February---	35.5	15.2	25.4	68	-23	16	.96	.35	1.56	2	5.7
March------	48.3	26.2	37.3	80	-6	102	2.38	.67	3.98	4	3.5
April------	62.2	37.4	49.8	89	14	321	3.43	1.61	4.85	7	1.3
May--------	73.0	49.1	61.1	91	27	653	4.32	2.40	6.05	8	.0
June-------	82.7	58.8	70.8	97	39	922	4.98	1.82	7.56	6	.0
July-------	85.8	63.1	74.5	99	45	1,068	4.62	2.00	7.12	6	.0
August-----	83.2	60.5	71.9	97	42	987	3.92	1.84	5.74	5	.0
September--	76.4	51.1	63.8	94	27	713	3.88	1.66	5.66	5	.0
October----	64.2	39.1	51.6	87	15	376	2.76	1.22	4.33	4	.5
November---	46.3	26.5	36.4	72	1	79	1.85	.69	3.04	3	2.6
December---	32.9	14.4	23.6	61	-19	8	1.11	.45	1.67	3	5.3
Yearly:											
Average---	60.0	37.6	48.8	---	---	---	---	---	---	---	---
Extreme---	104	-37	---	100	-29	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,247	35.05	26.99	41.10	55	25.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Atlantic, Iowa)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 25	May 13	May 20
2 years in 10 later than--	Apr. 20	May 8	May 16
5 years in 10 later than--	Apr. 12	Apr. 29	May 6
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 1	Sept. 23	Sept. 15
2 years in 10 earlier than--	Oct. 6	Sept. 27	Sept. 19
5 years in 10 earlier than--	Oct. 16	Oct. 5	Sept. 27

Table 3.--Growing Season

(Recorded in the period 1971-2000 at Atlantic, Iowa)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	168	147	132
8 years in 10	175	153	137
5 years in 10	188	164	148
2 years in 10	201	175	159
1 year in 10	207	181	164

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. These broad areas are called associations. Each association on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Sharpsburg-Shelby Association (fig. 6)

Extent of the association in the survey area: 32 percent

Component Description

Sharpsburg
Extent: 48 percent of the association
Position on the landscape: Backslopes, shoulders, summits
Slope range: 0 to 18 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to wet zone: 4 to 6 feet
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 3.7 percent

Shelby, moderately eroded
Extent: 18 percent of the association
Position on the landscape: Backslopes
Slope range: 5 to 25 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained

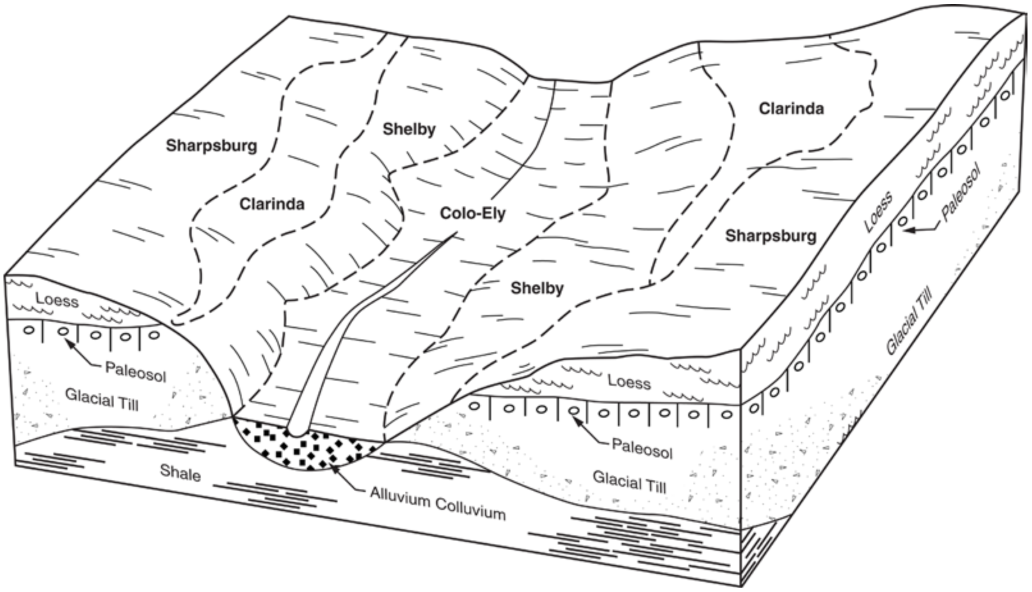
Sharpsburg
Shelby
Clarinda
Clarinda
Colo-Ely
Shelby
Sharpsburg
Loess
Paleosol
Glacial Till
Loess
Paleosol
Glacial Till
Shale
Alluvium Colluvium
Loess
Paleosol
Glacial Till

Figure 6.—Typical pattern of soils and parent material in the Sharpsburg-Shelby association.

Parent material: Subglacial till
Flooding: None
Ponding: None
Depth to wet zone: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Soils of Minor Extent

Colo, overwash, and similar soils
Extent: 14 percent of the association

Ely and similar soils
Extent: 12 percent of the association

Clarinda and similar soils
Extent: 8 percent of the association

2. Marshall-Exira-Judson Association (fig. 7)

Extent of the association in the survey area: 58 percent

Component Description

Marshall
Extent: 29 percent of the association
Position on the landscape: Backslopes, shoulders, summits
Slope range: 0 to 25 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess

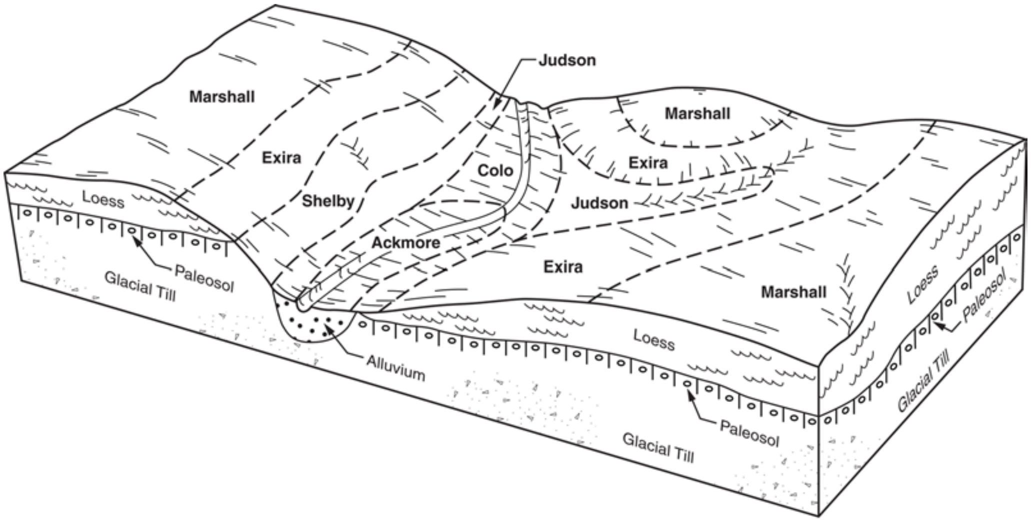
Judson
Marshall
Marshall
Exira
Exira
Shelby
Colo
Judson
Loess
Paleosol
Glacial Till
Ackmore
Exira
Marshall
Loess
Paleosol
Glacial Till
Alluvium
Loess
Paleosol
Glacial Till

Figure 7.—Typical pattern of soils and parent material in the Marshall-Exira-Judson association.

Flooding: None
Ponding: None
Depth to wet zone: More than 6.7 feet
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 3.6 percent

Exira
Extent: 23 percent of the association
Position on the landscape: Backslopes, shoulders, summits
Slope range: 5 to 18 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to wet zone: More than 6.7 feet
Available water capacity to a depth of 60 inches: 12.1 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Judson
Extent: 16 percent of the association
Position on the landscape: Footslopes
Slope range: 0 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Silty colluvium
Flooding: None
Ponding: None

Depth to wet zone: More than 6.7 feet
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Soils of Minor Extent

Shelby, moderately eroded, and similar soils
Extent: 13 percent of the association

Ackmore, occasionally flooded, and similar soils
Extent: 11 percent of the association

Marshall, terrace, and similar soils
Extent: 6 percent of the association

Clarinda and similar soils
Extent: 2 percent of the association

3. Nodaway-Zook Association (fig. 8)

Extent of the association in the survey area: 10 percent

Component Description

Nodaway
Extent: 52 percent of the association
Position on the landscape: Flood plains
Slope range: 0 to 3 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Alluvium
Frequency of flooding: Occasional
Ponding: None
Depth to wet zone: 4 to 6 feet

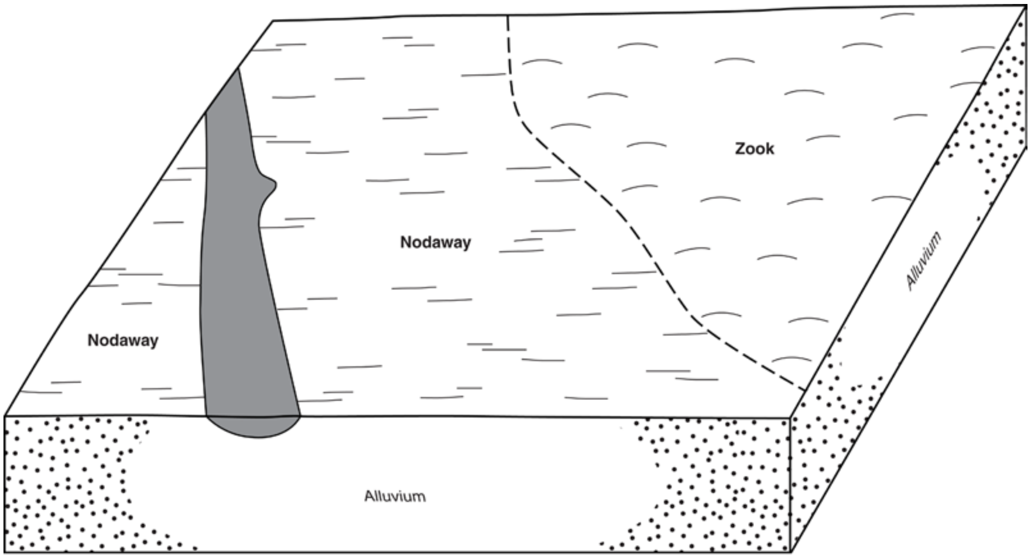

Figure 8.—Typical pattern of soils and parent material in the Nodaway-Zook association.

Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.5 percent

Zook
Extent: 48 percent of the association
Position on the landscape: Flood plains
Slope range: 0 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Frequency of flooding: Occasional
Ponding: None
Depth to wet zone: At the surface to 1 foot below the surface
Available water capacity to a depth of 60 inches: 10.7 inches
Content of organic matter in the upper 10 inches: 6.0 percent

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and lists some of the principal soil properties that should be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. The soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Sharpsburg silty clay loam, 0 to 2 percent slopes, is a phase of the Sharpsburg series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Olmitz-Ely-Zook complex, 2 to 5 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Pits, limestone quarries, is an example.

The table “Acreage and Proportionate Extent of the Soils” in Part II lists the map units in this survey area. Other tables provided in Part II give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

7—Wiota silty clay loam, 0 to 2 percent slopes, rarely flooded

Component Description

Wiota, rarely flooded, and similar soils
Extent: 80 to 90 percent of the map unit
Position on the landscape: Treads on stream terraces
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Alluvium
Frequency of flooding: Rare
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 12.2 inches
Content of organic matter in the upper 10 inches: 3.9 percent

Minor Dissimilar Components

Nevin, rarely flooded, and similar soils
Extent: 10 to 20 percent of the map unit

7B—Wiota silty clay loam, 2 to 5 percent slopes, rarely flooded

Component Description

Wiota, rarely flooded, and similar soils
Extent: 80 to 90 percent of the map unit
Position on the landscape: Treads and risers on stream terraces
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Alluvium

Frequency of flooding: Rare
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 12.2 inches
Content of organic matter in the upper 10 inches: 3.9 percent

Minor Dissimilar Components

Nevin, rarely flooded, and similar soils
Extent: 10 to 20 percent of the map unit

9—Marshall silty clay loam, 0 to 2 percent slopes

Component Description

Marshall and similar soils
Extent: 80 to 100 percent of the map unit
Position on the landscape: Ridges on uplands
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 3.6 percent

Minor Dissimilar Components

Minden and similar soils
Extent: 0 to 10 percent of the map unit

Corley and similar soils
Extent: 0 to 10 percent of the map unit

9B—Marshall silty clay loam, 2 to 5 percent slopes

Component Description

Marshall and similar soils
Extent: 100 percent of the map unit
Position on the landscape: Ridges and shoulders
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 3.6 percent

9C2—Marshall silty clay loam, 5 to 9 percent slopes, moderately eroded

Component Description

Marshall, moderately eroded, and similar soils
Extent: 70 to 90 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Exira, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Marshall and similar soils
Extent: 5 to 15 percent of the map unit

9C3—Marshall silty clay loam, 5 to 9 percent slopes, severely eroded

Component Description

Marshall, severely eroded, and similar soils
Extent: 65 to 95 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 11.5 inches
Content of organic matter in the upper 10 inches: 1.1 percent

Minor Dissimilar Components

Marshall, moderately eroded, and similar soils
Extent: 5 to 25 percent of the map unit

Judson and similar soils
Extent: 0 to 10 percent of the map unit

9D2—Marshall silty clay loam, 9 to 14 percent slopes, moderately eroded

Component Description

Marshall, moderately eroded, and similar soils
Extent: 55 to 85 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Exira, severely eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Marshall and similar soils
Extent: 5 to 15 percent of the map unit

Judson and similar soils
Extent: 0 to 10 percent of the map unit

15B—Olmitz-Ely-Zook complex, 2 to 5 percent slopes

Component Description

Olmitz and similar soils
Extent: 15 to 55 percent of the map unit
Position on the landscape: Footslopes along upland drainageways; alluvial fans
Slope range: 2 to 5 percent
Texture of the surface layer: Loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loamy local alluvium derived from glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 9.6 inches
Content of organic matter in the upper 10 inches: 3.2 percent

Ely and similar soils
Extent: 25 to 35 percent of the map unit
Position on the landscape: Footslopes along upland drainageways; alluvial fans
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Parent material: Colluvium
Flooding: None

Ponding: None
Depth to seasonal high water table: 1.0 to 3.5 feet
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 5.3 percent

Zook and similar soils
Extent: 15 to 25 percent of the map unit
Position on the landscape: Upland drainageways
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface
Available water capacity to a depth of 60 inches: 10.7 inches
Content of organic matter in the upper 10 inches: 6.0 percent

Minor Dissimilar Components

Vesser and similar soils
Extent: 5 to 15 percent of the map unit

Zook, frequently flooded, and similar soils
Extent: 0 to 10 percent of the map unit

16—Nodaway-Kennebec complex, 0 to 2 percent slopes, occasionally flooded

Component Description

Nodaway, occasionally flooded, and similar soils
Extent: 45 to 65 percent of the map unit
Position on the landscape: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Alluvium
Frequency of flooding: Occasional
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.5 percent

Kennebec, occasionally flooded, and similar soils
Extent: 30 to 40 percent of the map unit
Position on the landscape: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Alluvium
Frequency of flooding: Occasional
Ponding: None
Depth to seasonal high water table: 4 to 6 feet

Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 4.6 percent

Minor Dissimilar Components

Zook, occasionally flooded, and similar soils
Extent: 5 to 15 percent of the map unit

43—Bremer silty clay loam, 0 to 2 percent slopes, rarely flooded

Component Description

Bremer, rarely flooded, and similar soils
Extent: 65 to 95 percent of the map unit
Position on the landscape: Treads on stream terraces
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Frequency of flooding: Rare
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 6.0 percent

Minor Dissimilar Components

Zook, rarely flooded, and similar soils
Extent: 5 to 15 percent of the map unit

Wiota, rarely flooded, and similar soils
Extent: 0 to 10 percent of the map unit

Nevin, rarely flooded, and similar soils
Extent: 0 to 10 percent of the map unit

54—Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Zook, occasionally flooded, and similar soils
Extent: 85 to 95 percent of the map unit
Position on the landscape: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Frequency of flooding: Occasional
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface

Available water capacity to a depth of 60 inches: 10.7 inches
Content of organic matter in the upper 10 inches: 6.0 percent

Minor Dissimilar Components

Wabash, occasionally flooded, occasionally ponded, and similar soils
Extent: 5 to 15 percent of the map unit

54+—Zook silt loam, 0 to 2 percent slopes, occasionally flooded, overwash

Component Description

Zook, occasionally flooded, overwash, and similar soils
Extent: 55 to 95 percent of the map unit
Position on the landscape: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Frequency of flooding: Occasional
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface
Available water capacity to a depth of 60 inches: 13.0 inches
Content of organic matter in the upper 10 inches: 3.0 percent

Minor Dissimilar Components

Mt. Sterling, occasionally flooded, and similar soils
Extent: 5 to 25 percent of the map unit

Humeston, occasionally flooded, occasionally ponded, and similar soils
Extent: 0 to 10 percent of the map unit

Nodaway, occasionally flooded, and similar soils
Extent: 0 to 10 percent of the map unit

88—Nevin silty clay loam, 0 to 2 percent slopes, rarely flooded

Component Description

Nevin, rarely flooded, and similar soils
Extent: 80 to 100 percent of the map unit
Position on the landscape: Treads on stream terraces
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Parent material: Silty alluvium
Frequency of flooding: Rare
Ponding: None
Depth to seasonal high water table: 1.0 to 3.5 feet
Available water capacity to a depth of 60 inches: 12.2 inches
Content of organic matter in the upper 10 inches: 5.0 percent

Minor Dissimilar Components

Bremer, rarely flooded, and similar soils
Extent: 0 to 20 percent of the map unit

99D2—Exira silty clay loam, 9 to 14 percent slopes, moderately eroded

Component Description

Exira, moderately eroded, and similar soils
Extent: 45 to 85 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 12.1 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Exira, severely eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Shelby, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Adair, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Judson and similar soils
Extent: 0 to 10 percent of the map unit

99D3—Exira silty clay loam, 9 to 14 percent slopes, severely eroded

Component Description

Exira, severely eroded, and similar soils
Extent: 60 to 95 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 12.0 inches
Content of organic matter in the upper 10 inches: 1.3 percent

Minor Dissimilar Components

Shelby, severely eroded, and similar soils
Extent: 5 to 20 percent of the map unit

Adair, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Judson and similar soils
Extent: 0 to 10 percent of the map unit

99E2—Exira silty clay loam, 14 to 18 percent slopes, moderately eroded

Component Description

Exira, moderately eroded, and similar soils
Extent: 50 to 90 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 12.1 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Exira, severely eroded, and similar soils
Extent: 10 to 30 percent of the map unit

Ely and similar soils
Extent: 0 to 10 percent of the map unit

Colo, frequently flooded for very brief periods
Extent: 0 to 10 percent of the map unit

99E3—Exira silty clay loam, 14 to 18 percent slopes, severely eroded

Component Description

Exira, severely eroded, and similar soils
Extent: 70 to 90 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet

Available water capacity to a depth of 60 inches: 12.0 inches
Content of organic matter in the upper 10 inches: 1.3 percent

Minor Dissimilar Components

Shelby, severely eroded, and similar soils
Extent: 5 to 20 percent of the map unit

Judson and similar soils
Extent: 0 to 10 percent of the map unit

113B—Colo, overwash-Ely complex, 2 to 5 percent slopes

Component Description

Colo, frequently flooded, overwash, and similar soils
Extent: 35 to 75 percent of the map unit
Position on the landscape: Upland drainageways
Slope range: 2 to 5 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Silty alluvium
Frequency of flooding: Frequent
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface
Available water capacity to a depth of 60 inches: 12.0 inches
Content of organic matter in the upper 10 inches: 4.0 percent

Ely and similar soils
Extent: 20 to 30 percent of the map unit
Position on the landscape: Footslopes along upland drainageways; alluvial fans
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Parent material: Colluvium
Flooding: None
Ponding: None
Depth to seasonal high water table: 1.0 to 3.5 feet
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 5.3 percent

Minor Dissimilar Components

Ackmore, rarely flooded, and similar soils
Extent: 5 to 15 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

136—Ankeny fine sandy loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Ankeny, occasionally flooded, and similar soils
Extent: 90 to 100 percent of the map unit

Position on the landscape: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Fine sandy loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loamy alluvium and/or eolian deposits
Frequency of flooding: Occasional
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 8.8 inches
Content of organic matter in the upper 10 inches: 3.0 percent

Minor Dissimilar Components

Kennebec, occasionally flooded, and similar soils
Extent: 0 to 10 percent of the map unit

212—Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Kennebec, occasionally flooded, and similar soils
Extent: 60 to 80 percent of the map unit
Position on the landscape: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Alluvium
Frequency of flooding: Occasional
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 4.6 percent

Minor Dissimilar Components

Nodaway, occasionally flooded, and similar soils
Extent: 5 to 20 percent of the map unit

Colo, occasionally flooded, overwash, and similar soils
Extent: 0 to 10 percent of the map unit

Colo, occasionally flooded, and similar soils
Extent: 0 to 10 percent of the map unit

Mt. Sterling, occasionally flooded, and similar soils
Extent: 0 to 10 percent of the map unit

220—Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Nodaway, occasionally flooded, and similar soils
Extent: 65 to 85 percent of the map unit
Position on the landscape: Flood plains

Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Alluvium
Frequency of flooding: Occasional
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.5 percent

Minor Dissimilar Components

Ackmore, occasionally flooded, and similar soils
Extent: 15 to 25 percent of the map unit

Zook, occasionally flooded, and similar soils
Extent: 0 to 10 percent of the map unit

229C2—Clarinda, moderately eroded-Clarinda, severely eroded, complex, 5 to 9 percent slopes

Component Description

Clarinda, moderately eroded, and similar soils
Extent: 15 to 65 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: 6 inches to an abrupt textural change
Drainage class: Poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface (perched)
Available water capacity to a depth of 60 inches: 6.7 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Clarinda, severely eroded, and similar soils
Extent: 15 to 25 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay
Depth to restrictive feature: 4 inches to an abrupt textural change
Drainage class: Poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface (perched)
Available water capacity to a depth of 60 inches: 6.1 inches
Content of organic matter in the upper 10 inches: 1.0 percent

Minor Dissimilar Components

Lamoni, severely eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Exira, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Judson and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

229D2—Clarinda, moderately eroded-Clarinda, severely eroded, complex, 9 to 14 percent slopes

Component Description

Clarinda, moderately eroded, and similar soils
Extent: 30 to 70 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: 6 inches to an abrupt textural change
Drainage class: Poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface (perched)
Available water capacity to a depth of 60 inches: 6.7 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Clarinda, severely eroded, and similar soils
Extent: 15 to 25 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay
Depth to restrictive feature: 4 inches to an abrupt textural change
Drainage class: Poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface (perched)
Available water capacity to a depth of 60 inches: 6.1 inches
Content of organic matter in the upper 10 inches: 1.0 percent

Minor Dissimilar Components

Exira, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Judson and similar soils
Extent: 0 to 10 percent of the map unit

Lamoni, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Shelby, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

247D2—Shelby, sandy substratum-Hesch, deep-Hesch complex, 9 to 14 percent slopes, moderately eroded

Component Description

Shelby, sandy substratum, moderately eroded, and similar soils
Extent: 15 to 55 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 10.3 inches
Content of organic matter in the upper 10 inches: 1.6 percent

Hesch, deep, moderately eroded, and similar soils
Extent: 20 to 30 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Loam
Depth to restrictive feature: 49 inches to paralithic bedrock
Drainage class: Well drained
Parent material: Loamy deposit and residuum derived from sandstone
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 7.7 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Hesch, moderately eroded, and similar soils
Extent: 15 to 25 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Loam
Depth to restrictive feature: 28 inches to paralithic bedrock
Drainage class: Well drained
Parent material: Loamy deposit and residuum derived from sandstone
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 4.2 inches
Content of organic matter in the upper 10 inches: 2.3 percent

Minor Dissimilar Components

Munterville, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

269—Humeston silty clay loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Humeston, occasionally flooded, occasionally ponded, and similar soils
Extent: 100 percent of the map unit
Position on the landscape: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Frequency of flooding: Occasional
Frequency of ponding: Occasional
Seasonal high water table: At the surface
Available water capacity to a depth of 60 inches: 11.4 inches
Content of organic matter in the upper 10 inches: 3.5 percent

273B—Olmitz loam, 2 to 5 percent slopes

Component Description

Olmitz and similar soils
Extent: 65 to 95 percent of the map unit
Position on the landscape: Footslopes; alluvial fans
Slope range: 2 to 5 percent
Texture of the surface layer: Loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loamy local alluvium derived from glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 9.6 inches
Content of organic matter in the upper 10 inches: 3.2 percent

Minor Dissimilar Components

Shelby and similar soils
Extent: 5 to 15 percent of the map unit

Ely and similar soils
Extent: 0 to 10 percent of the map unit

Zook, occasionally flooded, and similar soils
Extent: 0 to 10 percent of the map unit

289D2—Dickman, loamy substratum-Marshall complex, 9 to 14 percent slopes, moderately eroded

Component Description

Dickman, loamy substratum, moderately eroded, and similar soils
Extent: 10 to 60 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent

Texture of the surface layer: Fine sandy loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Eolian sands
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 7.5 inches
Content of organic matter in the upper 10 inches: 1.1 percent

Marshall, moderately eroded, and similar soils
Extent: 25 to 35 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Arthur, moderately eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Dickinson, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Arthur, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

300—Bremer silty clay loam, 0 to 2 percent slopes

Component Description

Bremer, terrace, and similar soils
Extent: 80 to 100 percent of the map unit
Position on the landscape: Treads on high stream terraces
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Loess
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 6.0 percent

Minor Dissimilar Components

Minden, terrace, and similar soils
Extent: 0 to 10 percent of the map unit

Melia, terrace, and similar soils
Extent: 0 to 10 percent of the map unit

337D2—Dickman, loamy substratum-Sharpsburg complex, 9 to 14 percent slopes, moderately eroded

Component Description

Dickman, loamy substratum, moderately eroded, and similar soils
Extent: 30 to 60 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Fine sandy loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Eolian sands
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 7.5 inches
Content of organic matter in the upper 10 inches: 1.1 percent

Sharpsburg, moderately eroded, and similar soils
Extent: 35 to 45 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.8 percent

Minor Dissimilar Components

Dickinson, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Arthur, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

370—Sharpsburg silty clay loam, 0 to 2 percent slopes

Component Description

Sharpsburg and similar soils
Extent: 90 to 100 percent of the map unit
Position on the landscape: Ridges
Slope range: 0 to 2 percent

Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 3.7 percent

Minor Dissimilar Components

Macksburg and similar soils
Extent: 0 to 10 percent of the map unit

370B—Sharpsburg silty clay loam, 2 to 5 percent slopes

Component Description

Sharpsburg and similar soils
Extent: 75 to 90 percent of the map unit
Position on the landscape: Ridges and shoulders
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 3.7 percent

Minor Dissimilar Components

Sharpsburg, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Nira and similar soils
Extent: 0 to 10 percent of the map unit

Macksburg and similar soils
Extent: 0 to 10 percent of the map unit

371C2—Sharpsburg-Nira complex, 5 to 9 percent slopes, moderately eroded

Component Description

Sharpsburg, moderately eroded, and similar soils
Extent: 45 to 75 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess

Flooding: None
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.8 percent

Nira, moderately eroded, and similar soils
Extent: 25 to 35 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: 2 to 4 feet
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Clearfield, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

371D2—Sharpsburg-Nira complex, 9 to 14 percent slopes, moderately eroded

Component Description

Sharpsburg and similar soils
Extent: 20 to 70 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 3.7 percent

Sharpsburg, moderately eroded, and similar soils
Extent: 15 to 25 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: 4 to 6 feet

Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.8 percent

Nira, moderately eroded, and similar soils
Extent: 15 to 25 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: 2 to 4 feet
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Sharpsburg, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Lamoni, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Judson and similar soils
Extent: 0 to 10 percent of the map unit

371E2—Sharpsburg-Nira complex, 14 to 18 percent slopes, moderately eroded

Component Description

Sharpsburg, moderately eroded, and similar soils
Extent: 25 to 85 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.8 percent

Nira, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess
Flooding: None
Ponding: None

Depth to seasonal high water table: 2 to 4 feet
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Sharpsburg, severely eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Shelby, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Nira, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Lamoni, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Judson and similar soils
Extent: 0 to 10 percent of the map unit

430—Ackmore silt loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Ackmore, occasionally flooded, and similar soils
Extent: 65 to 85 percent of the map unit
Position on the landscape: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Parent material: Alluvium
Frequency of flooding: Occasional
Ponding: None
Depth to seasonal high water table: 1.0 to 3.5 feet
Available water capacity to a depth of 60 inches: 12.1 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Nodaway, occasionally flooded, and similar soils
Extent: 15 to 25 percent of the map unit

Zook, occasionally flooded, and similar soils
Extent: 0 to 10 percent of the map unit

431B—Judson-Ackmore-Colo, overwash, complex, 1 to 5 percent slopes

Component Description

Judson and similar soils
Extent: 40 to 60 percent of the map unit
Position on the landscape: Footslopes along upland drainageways
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)

Drainage class: Well drained
Parent material: Silty colluvium
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Ackmore, rarely flooded, and similar soils
Extent: 15 to 35 percent of the map unit
Position on the landscape: Upland drainageways
Slope range: 1 to 3 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Parent material: Alluvium
Frequency of flooding: Rare
Ponding: None
Depth to seasonal high water table: 1.0 to 3.5 feet
Available water capacity to a depth of 60 inches: 12.1 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Colo, frequently flooded, overwash, and similar soils
Extent: 5 to 25 percent of the map unit
Position on the landscape: Upland drainageways
Slope range: 1 to 3 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Silty alluvium
Frequency of flooding: Frequent
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface
Available water capacity to a depth of 60 inches: 12.0 inches
Content of organic matter in the upper 10 inches: 4.0 percent

Minor Dissimilar Components

Nodaway, frequently flooded, and similar soils
Extent: 0 to 10 percent of the map unit

435—Zook-Mt. Sterling complex, 0 to 2 percent slopes, occasionally flooded

Component Description

Zook, occasionally flooded, and similar soils
Extent: 20 to 60 percent of the map unit
Position on the landscape: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Frequency of flooding: Occasional
Ponding: None

Seasonal high water table: At the surface to 1 foot below the surface
Available water capacity to a depth of 60 inches: 10.7 inches
Content of organic matter in the upper 10 inches: 6.0 percent

Mt. Sterling, occasionally flooded, and similar soils
Extent: 30 to 40 percent of the map unit
Position on the landscape: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Frequency of flooding: Occasional
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Minor Dissimilar Components

Humeston, occasionally flooded, overwash, and similar soils
Extent: 5 to 15 percent of the map unit

Nodaway, occasionally flooded, and similar soils
Extent: 5 to 15 percent of the map unit

Kennebec, occasionally flooded, and similar soils
Extent: 0 to 10 percent of the map unit

469C2—Lamoni-Clarinda-Shelby complex, 5 to 9 percent slopes, moderately eroded

Component Description

Lamoni, moderately eroded, and similar soils
Extent: 10 to 60 percent of the map unit
Position on the landscape: Side slopes and shoulders
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: 6 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 8.9 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Clarinda, moderately eroded, and similar soils
Extent: 25 to 35 percent of the map unit
Position on the landscape: Side slopes and shoulders
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: 6 inches to an abrupt textural change
Drainage class: Poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None

Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface (perched)
Available water capacity to a depth of 60 inches: 6.7 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Shelby, moderately eroded, and similar soils
Extent: 15 to 25 percent of the map unit
Position on the landscape: Side slopes and shoulders
Slope range: 5 to 9 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Minor Dissimilar Components

Clarinda, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Ely and similar soils
Extent: 0 to 10 percent of the map unit

Sharpsburg and similar soils
Extent: 0 to 10 percent of the map unit

469C3—Lamoni-Clarinda-Shelby complex, 5 to 9 percent slopes, severely eroded

Component Description

Lamoni, severely eroded, and similar soils
Extent: 10 to 60 percent of the map unit
Position on the landscape: Side slopes and shoulders
Slope range: 5 to 9 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 7 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 9.2 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Clarinda, severely eroded, and similar soils
Extent: 25 to 35 percent of the map unit
Position on the landscape: Side slopes and shoulders
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay
Depth to restrictive feature: 4 inches to an abrupt textural change
Drainage class: Poorly drained

Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface (perched)
Available water capacity to a depth of 60 inches: 6.1 inches
Content of organic matter in the upper 10 inches: 1.0 percent

Shelby, severely eroded, and similar soils
Extent: 15 to 25 percent of the map unit
Position on the landscape: Side slopes and shoulders
Slope range: 5 to 9 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.7 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Ely and similar soils
Extent: 0 to 10 percent of the map unit

Lamoni and similar soils
Extent: 0 to 10 percent of the map unit

Nira and similar soils
Extent: 0 to 10 percent of the map unit

470D2—Lamoni-Shelby complex, 9 to 14 percent slopes, moderately eroded

Component Description

Lamoni, moderately eroded, and similar soils
Extent: 5 to 70 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: 6 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 8.9 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Shelby, moderately eroded, and similar soils
Extent: 20 to 30 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent

Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Minor Dissimilar Components

Shelby, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Clarinda, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Clarinda, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Lamoni, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Nira, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

509B—Marshall silty clay loam, terrace, 2 to 5 percent slopes

Component Description

Marshall, terrace, and similar soils
Extent: 80 to 100 percent of the map unit
Position on the landscape: Treads and risers on stream terraces
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 3.6 percent

Minor Dissimilar Components

Marshall, terrace, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Colo, frequently flooded for very brief periods
Extent: 0 to 10 percent of the map unit

509C—Marshall silty clay loam, terrace, 5 to 9 percent slopes

Component Description

Marshall, terrace, and similar soils
Extent: 85 to 95 percent of the map unit
Position on the landscape: Risers on stream terraces
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 3.6 percent

Minor Dissimilar Components

Judson and similar soils
Extent: 5 to 15 percent of the map unit

509C2—Marshall silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded

Component Description

Marshall, terrace, moderately eroded, and similar soils
Extent: 90 to 100 percent of the map unit
Position on the landscape: Risers on stream terraces
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.3 percent

Minor Dissimilar Components

Marshall, terrace, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

545B—Zook-Ely-Gullied land complex, 2 to 5 percent slopes

Component Description

Zook and similar soils
Extent: 10 to 60 percent of the map unit
Position on the landscape: Flood plains

Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface
Available water capacity to a depth of 60 inches: 10.7 inches
Content of organic matter in the upper 10 inches: 6.0 percent

Ely and similar soils
Extent: 25 to 35 percent of the map unit
Position on the landscape: Footslopes along upland drainageways
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Parent material: Colluvium
Flooding: None
Ponding: None
Depth to seasonal high water table: 1.0 to 3.5 feet
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 5.3 percent

Gullied land
Extent: 20 percent of the map unit
Slope range: 2 to 5 percent

Minor Dissimilar Components

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Vesser and similar soils
Extent: 0 to 10 percent of the map unit

Zook, occasionally flooded, overwash, and similar soils
Extent: 0 to 10 percent of the map unit

733—Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Calco, occasionally flooded, and similar soils
Extent: 80 to 100 percent of the map unit
Position on the landscape: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Calcareous alluvium
Frequency of flooding: Occasional
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface (perched)

Available water capacity to a depth of 60 inches: 13.2 inches
Content of organic matter in the upper 10 inches: 5.7 percent

Minor Dissimilar Components

Colo, occasionally flooded, and similar soils
Extent: 0 to 20 percent of the map unit

803—Melia silty clay loam, terrace, 0 to 2 percent slopes

Component Description

Melia, terrace, and similar soils
Extent: 80 to 100 percent of the map unit
Position on the landscape: Treads on stream terraces
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 12.2 inches
Content of organic matter in the upper 10 inches: 3.8 percent

Minor Dissimilar Components

Minden, terrace, and similar soils
Extent: 0 to 20 percent of the map unit

824E3—Shelby-Lamoni complex, 14 to 18 percent slopes, severely eroded

Component Description

Shelby, severely eroded, and similar soils
Extent: 20 to 80 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.7 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Lamoni, severely eroded, and similar soils
Extent: 20 to 40 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 7 inches to an abrupt textural change
Drainage class: Somewhat poorly drained

Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 9.2 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Minor Dissimilar Components

Clarinda, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Liston, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Sharpsburg, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

870B—Sharpsburg silty clay loam, terrace, 1 to 5 percent slopes

Component Description

Sharpsburg, terrace, and similar soils
Extent: 80 to 90 percent of the map unit
Position on the landscape: Treads and risers on stream terraces
Slope range: 1 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: 4 to 6 feet
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Minor Dissimilar Components

Macksburg, terrace, and similar soils
Extent: 10 to 20 percent of the map unit

1239—Corley-Minden complex, terrace, 0 to 2 percent slopes

Component Description

Corley, terrace, and similar soils
Extent: 50 to 70 percent of the map unit
Position on the landscape: Treads on stream terraces
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Loess

Flooding: None
Frequency of ponding: Frequent
Seasonal high water table: At the surface
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 4.0 percent

Minden, terrace, and similar soils
Extent: 25 to 35 percent of the map unit
Position on the landscape: Treads on stream terraces
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Parent material: Loess
Flooding: None
Ponding: None
Depth to seasonal high water table: 1.0 to 3.5 feet
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 5.1 percent

Minor Dissimilar Components

Melia, terrace, and similar soils
Extent: 5 to 15 percent of the map unit

2428—Ely-Colo, overwash-Mt. Sterling complex, 0 to 2 percent slopes

Component Description

Ely and similar soils
Extent: 25 to 65 percent of the map unit
Position on the landscape: Alluvial fans
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Parent material: Colluvium
Flooding: None
Ponding: None
Depth to seasonal high water table: 1.0 to 3.5 feet
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 5.3 percent

Colo, overwash, and similar soils
Extent: 15 to 35 percent of the map unit
Position on the landscape: Alluvial fans
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Silty alluvium
Frequency of flooding: Frequent
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface

Available water capacity to a depth of 60 inches: 12.0 inches
Content of organic matter in the upper 10 inches: 4.0 percent

Mt. Sterling and similar soils
Extent: 15 to 25 percent of the map unit
Position on the landscape: Alluvial fans
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Frequency of flooding: Frequent
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Minor Dissimilar Components

Judson and similar soils
Extent: 5 to 15 percent of the map unit

4946C—Udorthents-Highway complex, 0 to 9 percent slopes

Component Description

Udorthents and similar soils
Extent: 65 to 70 percent of the map unit
Slope range: 0 to 9 percent
Texture of the surface layer: Variable
Depth to restrictive feature: Very deep (more than 60 inches)
Parent material: Loamy deposits
Flooding: None
Ponding: None

Interstate highway
Extent: 30 to 35 percent of the map unit
Slope range: 0 to 9 percent

5030—Pits, limestone quarries

- This map unit consists of areas from which limestone has been removed.

5040—Udorthents, loamy

Component Description

Udorthents, loamy, and similar soils
Extent: 100 percent of the map unit
Texture of the surface layer: Variable
Depth to restrictive feature: Very deep (more than 60 inches)
Parent material: Loamy manipulated materials
Flooding: None
Ponding: None

5080—Udorthents, sanitary landfill

Component Description

Udorthents, sanitary landfill
Extent: 100 percent of the map unit
Texture of the surface layer: Variable
Depth to restrictive feature: Very deep (more than 60 inches)
Parent material: Loamy manipulated materials
Flooding: None
Ponding: None

AW—Animal waste lagoon

- This map unit consists of shallow ponds constructed to hold animal waste from feedlots.

SL—Sewage lagoon

- This map unit consists of shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid waste.

W—Water

- This map unit consists of natural bodies of water.

Y8B—Judson silty clay loam, MLRA 108D, 2 to 5 percent slopes

Component Description

Judson and similar soils
Extent: 75 to 95 percent of the map unit
Position on the landscape: Footslopes along upland drainageways; alluvial fans
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Silty colluvium
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Minor Dissimilar Components

Ely and similar soils
Extent: 0 to 10 percent of the map unit

Vesser and similar soils
Extent: 0 to 10 percent of the map unit

Zook, occasionally flooded, and similar soils
Extent: 0 to 10 percent of the map unit

Y8C—Judson silty clay loam, MLRA 108D, 5 to 9 percent slopes

Component Description

Judson and similar soils
Extent: 75 to 95 percent of the map unit
Position on the landscape: Footslopes along upland drainageways; alluvial fans
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Silty colluvium
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Minor Dissimilar Components

Ely and similar soils
Extent: 0 to 10 percent of the map unit

Vesser and similar soils
Extent: 0 to 10 percent of the map unit

Zook, occasionally flooded, and similar soils
Extent: 0 to 10 percent of the map unit

Y24C2—Shelby clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 35 to 85 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Minor Dissimilar Components

Adair, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Sharpsburg, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Adair, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Y24D2—Shelby clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 35 to 95 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Minor Dissimilar Components

Clarinda, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Adair and similar soils
Extent: 0 to 10 percent of the map unit

Adair, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Nira, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Shelby, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Y24D3—Shelby clay loam, MLRA 108D, 9 to 14 percent slopes, severely eroded

Component Description

Shelby, severely eroded, and similar soils
Extent: 30 to 80 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent

Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.7 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Shelby, moderately eroded, and similar soils
Extent: 15 to 25 percent of the map unit

Adair, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Clarinda, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Nira, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Y24E—Shelby clay loam, MLRA 108D, 14 to 18 percent slopes

Component Description

Shelby and similar soils
Extent: 40 to 80 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.7 inches
Content of organic matter in the upper 10 inches: 3.3 percent

Minor Dissimilar Components

Shelby, moderately eroded, and similar soils
Extent: 15 to 35 percent of the map unit

Lamoni and similar soils
Extent: 5 to 15 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Y24E2—Shelby clay loam, MLRA 108D, 14 to 18 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 45 to 65 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Minor Dissimilar Components

Adair, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Clarinda, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Nira, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Y24E3—Shelby clay loam, MLRA 108D, 14 to 18 percent slopes, severely eroded

Component Description

Shelby, severely eroded, and similar soils
Extent: 10 to 80 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.7 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Shelby, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Clarinda, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Adair, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Nira, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Y24F2—Shelby clay loam, MLRA 108D, 18 to 25 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 25 to 75 percent of the map unit
Position on the landscape: Side slopes
Slope range: 18 to 25 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Minor Dissimilar Components

Shelby, severely eroded, and similar soils
Extent: 15 to 25 percent of the map unit

Adair, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Sharpsburg, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Clarinda, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Y24F3—Shelby clay loam, MLRA 108D, 18 to 25 percent slopes, severely eroded

Component Description

Shelby, severely eroded, and similar soils
Extent: 15 to 85 percent of the map unit
Position on the landscape: Side slopes
Slope range: 18 to 25 percent
Texture of the surface layer: Clay loam

Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.7 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Shelby, moderately eroded, and similar soils
Extent: 15 to 55 percent of the map unit

Adair, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Clarinda, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Y82C3—Adair-Shelby complex, MLRA 108D, 5 to 9 percent slopes, severely eroded

Component Description

Adair, severely eroded, and similar soils
Extent: 45 to 75 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 3 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Loess and the underlying red paleosol that formed in glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 8.3 inches
Content of organic matter in the upper 10 inches: 1.2 percent

Shelby, severely eroded, and similar soils
Extent: 20 to 30 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.7 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Nira, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Liston, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Y93D2—Shelby-Adair complex, MLRA 108D, 9 to 14 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 20 to 50 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Adair, moderately eroded, and similar soils
Extent: 10 to 40 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 7 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Loess and the underlying red paleosol that formed in glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 9.1 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Clarinda, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Adair, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Clarinda, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Sharpsburg and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Y93D3—Shelby-Adair complex, MLRA 108D, 9 to 14 percent slopes, severely eroded

Component Description

Shelby, severely eroded, and similar soils
Extent: 5 to 65 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.7 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Adair, severely eroded, and similar soils
Extent: 20 to 40 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 3 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Loess and the underlying red paleosol that formed in glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 8.3 inches
Content of organic matter in the upper 10 inches: 1.2 percent

Minor Dissimilar Components

Adair, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Sharpsburg, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Y93E2—Shelby-Adair complex, MLRA 108D, 14 to 18 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 15 to 70 percent of the map unit

Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Adair, moderately eroded, and similar soils
Extent: 25 to 35 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 7 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Loess and the underlying red paleosol that formed in glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 9.1 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Clarinda, moderately eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Adair, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Sharpsburg, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Y192C2—Adair clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded

Component Description

Adair, moderately eroded, and similar soils
Extent: 45 to 85 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 7 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Loess and the underlying red paleosol that formed in glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)

Available water capacity to a depth of 60 inches: 9.1 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Adair, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Olmitz and similar soils
Extent: 5 to 15 percent of the map unit

Sharpsburg, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Y192D2—Adair clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded

Component Description

Adair, moderately eroded, and similar soils
Extent: 20 to 90 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 7 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Loess and the underlying red paleosol that formed in glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 9.1 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Adair, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Clarinda and similar soils
Extent: 0 to 10 percent of the map unit

Nira, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Sharpsburg and similar soils
Extent: 0 to 10 percent of the map unit

Shelby, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Y222C2—Clarinda silty clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded

Component Description

Clarinda, moderately eroded, and similar soils
Extent: 65 to 85 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: 6 inches to an abrupt textural change
Drainage class: Poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface (perched)
Available water capacity to a depth of 60 inches: 6.7 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Minor Dissimilar Components

Clarinda, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Ely and similar soils
Extent: 0 to 10 percent of the map unit

Lamoni, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Nira, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Zook, frequently flooded, and similar soils
Extent: 0 to 10 percent of the map unit

Y222D2—Clarinda silty clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded

Component Description

Clarinda, moderately eroded, and similar soils
Extent: 35 to 85 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: 6 inches to an abrupt textural change
Drainage class: Poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface (perched)
Available water capacity to a depth of 60 inches: 6.7 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Minor Dissimilar Components

Clarinda, severely eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Lamoni, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Nira, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Ely and similar soils
Extent: 0 to 10 percent of the map unit

Zook, frequently flooded, and similar soils
Extent: 0 to 10 percent of the map unit

Y222D3—Clarinda silty clay loam, MLRA 108D, 9 to 14 percent slopes, severely eroded

Component Description

Clarinda, severely eroded, and similar soils
Extent: 50 to 90 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay
Depth to restrictive feature: 4 inches to an abrupt textural change
Drainage class: Poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface (perched)
Available water capacity to a depth of 60 inches: 6.1 inches
Content of organic matter in the upper 10 inches: 1.0 percent

Minor Dissimilar Components

Lamoni, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Ely and similar soils
Extent: 0 to 10 percent of the map unit

Sharpsburg and similar soils
Extent: 0 to 10 percent of the map unit

Z8B—Judson silty clay loam, MLRA 107B, 2 to 5 percent slopes

Component Description

Judson and similar soils
Extent: 70 to 90 percent of the map unit
Position on the landscape: Footslopes
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Silty colluvium

Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Minor Dissimilar Components

Ackmore, rarely flooded, and similar soils
Extent: 5 to 15 percent of the map unit

Colo, frequently flooded, overwash, and similar soils
Extent: 5 to 15 percent of the map unit

Z8C—Judson silty clay loam, MLRA 107B, 5 to 9 percent slopes

Component Description

Judson and similar soils
Extent: 65 to 85 percent of the map unit
Position on the landscape: Footslopes
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Silty colluvium
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Minor Dissimilar Components

Ackmore, rarely flooded, and similar soils
Extent: 5 to 15 percent of the map unit

Colo, frequently flooded for very brief periods
Extent: 0 to 10 percent of the map unit

Marshall and similar soils
Extent: 0 to 10 percent of the map unit

Shelby, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Z24D2—Shelby clay loam, MLRA 107B, 9 to 14 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 25 to 80 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)

Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Minor Dissimilar Components

Burchard, severely eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Clarinda, moderately eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Exira, severely eroded, and similar soils
Extent: 0 to 15 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Z24D3—Shelby clay loam, MLRA 107B, 9 to 14 percent slopes, severely eroded

Component Description

Shelby, severely eroded, and similar soils
Extent: 75 to 95 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.7 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Adair, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Z24E2—Shelby clay loam, MLRA 107B, 14 to 18 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 25 to 85 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent

Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Minor Dissimilar Components

Liston, severely eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Adair, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Exira, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Burchard, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Clarinda, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Z24E3—Shelby clay loam, MLRA 107B, 14 to 18 percent slopes, severely eroded

Component Description

Shelby, severely eroded, and similar soils
Extent: 35 to 75 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.7 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Adair, severely eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Exira, severely eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Clarinda, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Liston, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Z24F2—Shelby clay loam, MLRA 107B, 18 to 25 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 35 to 85 percent of the map unit
Position on the landscape: Side slopes
Slope range: 18 to 25 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Minor Dissimilar Components

Shelby, severely eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Marshall, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Lamoni, moderately eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Liston, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Z82D3—Adair-Shelby complex, MLRA 107B, 9 to 14 percent slopes, severely eroded

Component Description

Adair, severely eroded, and similar soils
Extent: 5 to 65 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 3 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Loess and the underlying red paleosol that formed in glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)

Available water capacity to a depth of 60 inches: 8.3 inches
Content of organic matter in the upper 10 inches: 1.2 percent

Shelby, severely eroded, and similar soils
Extent: 20 to 40 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.7 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Clarinda, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Marshall, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Olmitz and similar soils
Extent: 5 to 15 percent of the map unit

Liston, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Z93C2—Shelby-Adair complex, MLRA 107B, 5 to 9 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 20 to 60 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Adair, moderately eroded, and similar soils
Extent: 30 to 40 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 7 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Loess and the underlying red paleosol that formed in glacial till

Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 9.1 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Adair, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Marshall, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Z93D2—Shelby-Adair complex, MLRA 107B, 9 to 14 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 55 to 75 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Adair, moderately eroded, and similar soils
Extent: 10 to 30 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 7 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Red paleosol and the underlying glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 9.1 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Exira, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Burchard, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Z93E2—Shelby-Adair complex, MLRA 107B, 14 to 18 percent slopes, moderately eroded

Component Description

Shelby, moderately eroded, and similar soils
Extent: 30 to 60 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: More than 6.7 feet
Available water capacity to a depth of 60 inches: 9.5 inches
Content of organic matter in the upper 10 inches: 2.4 percent

Adair, moderately eroded, and similar soils
Extent: 30 to 40 percent of the map unit
Position on the landscape: Side slopes
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 7 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Loess and the underlying red paleosol that formed in glacial till
Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 9.1 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Marshall, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Adair, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Olmitz and similar soils
Extent: 0 to 10 percent of the map unit

Z192C3—Adair clay loam, MLRA 107B, 5 to 9 percent slopes, severely eroded

Component Description

Adair, severely eroded, and similar soils
Extent: 30 to 70 percent of the map unit
Position on the landscape: Shoulders and side slopes
Slope range: 5 to 9 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: 3 inches to an abrupt textural change
Drainage class: Somewhat poorly drained
Parent material: Loess and the underlying red paleosol that formed in glacial till

Flooding: None
Ponding: None
Depth to seasonal high water table: 1 to 2 feet (perched)
Available water capacity to a depth of 60 inches: 8.3 inches
Content of organic matter in the upper 10 inches: 1.2 percent

Minor Dissimilar Components

Marshall, severely eroded, and similar soils
Extent: 15 to 25 percent of the map unit

Shelby, severely eroded, and similar soils
Extent: 10 to 20 percent of the map unit

Clarinda, severely eroded, and similar soils
Extent: 0 to 10 percent of the map unit

Judson and similar soils
Extent: 0 to 10 percent of the map unit

Z222D2—Clarinda silty clay loam, MLRA 107B, 9 to 14 percent slopes, moderately eroded

Component Description

Clarinda, moderately eroded, and similar soils
Extent: 60 to 80 percent of the map unit
Position on the landscape: Side slopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: 6 inches to an abrupt textural change
Drainage class: Poorly drained
Parent material: Gray paleosol and the underlying glacial till
Flooding: None
Ponding: None
Seasonal high water table: At the surface to 1 foot below the surface (perched)
Available water capacity to a depth of 60 inches: 6.7 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Minor Dissimilar Components

Adair, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Exira, moderately eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Shelby, severely eroded, and similar soils
Extent: 5 to 15 percent of the map unit

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2010). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol.* An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udoll (*Ud*, meaning humid, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiudolls (*Argi*, referring to argillic, plus *udolls*, the suborder of the Mollisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Typic Argiudolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, superactive, mesic Typic Argiudolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

The table “Classification of the Soils” in Part II of this publication indicates the order, suborder, great group, subgroup, and family of the soil series in the survey area.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (Soil Survey Staff, 1999) and in *Keys to Soil Taxonomy* (Soil Survey Staff, 2010). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Ackmore Series

Typical Pedon

Ackmore silt loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain in Warren County, Iowa; about 2,230 feet west and 275 feet south of the northeast corner of sec. 5, T. 75 N., R. 25 W.; USGS Saint Charles (IA) topographic quadrangle; lat. 41 degrees 20 minutes 12 seconds N. and long. 93 degrees 45 minutes 34 seconds W.; NAD 83:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; moderately acid; abrupt smooth boundary.

C—6 to 25 inches; stratified very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) silt loam; massive with weak thin alluvial stratification; friable; few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; clear smooth boundary.

Ab1—25 to 30 inches; black (10YR 2/1) silty clay loam; weak fine subangular blocky structure parting to weak fine granular; friable; moderately acid; clear smooth boundary.

Ab2—30 to 44 inches; black (10YR 2/1) silty clay loam; weak medium prismatic structure parting to moderate very fine and fine subangular blocky; friable; few fine dark iron-manganese masses; slightly acid; clear smooth boundary.

Ab3—44 to 60 inches; black (10YR 2/1) silty clay loam; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few fine dark iron-manganese masses; neutral.

Range in Characteristics

Depth to buried horizons: 20 to 40 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

C horizon:
Hue—10YR
Value—2 to 5
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

Ab horizon:
Hue—10YR or N

Value—2 to 4
Chroma—0 to 2
Texture—silty clay loam or silt loam
Reaction—moderately acid to slightly alkaline

Adair Series

Typical Pedon

Adair clay loam (fig. 9), in an area of Shelby-Adair complex, 9 to 14 percent slopes, moderately eroded, in a pasture in Adams County, Iowa; about 385 feet east and 580 feet south of the northwest corner of sec. 31, T. 72 N., R. 32 W.; USGS Lenox (IA) topographic quadrangle; lat. 40 degrees 59 minutes 50.0 seconds N. and long. 94 degrees 35 minutes 05.3 seconds W.; NAD 83:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; common very fine roots; common very fine tubular pores; neutral; abrupt smooth boundary.

2Bt1—7 to 17 inches; brown (7.5YR 4/4) clay; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; common fine roots; common very fine tubular pores; many distinct brown (7.5YR 4/3) clay films on faces of peds; few fine distinct yellowish red (5YR 4/6) redoximorphic concentrations; about 1 percent subrounded fine gravel; slightly acid; clear smooth boundary.

2Bt2—17 to 24 inches; yellowish brown (10YR 5/4) clay loam; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; firm; common very fine roots; many very fine tubular pores; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; common fine distinct grayish brown (10YR 5/2) redoximorphic depletions; about 3 percent subrounded fine gravel; slightly acid; gradual smooth boundary.

2Bt3—24 to 34 inches; yellowish brown (10YR 5/4) clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; common very fine roots; common very fine tubular pores; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common medium distinct yellowish brown (10YR 5/6) redoximorphic concentrations; common medium distinct grayish brown (10YR 5/2) redoximorphic depletions; about 2 percent subrounded fine gravel; slightly acid; gradual smooth boundary.

2Bt4—34 to 45 inches; about 60 percent yellowish brown (10YR 5/4) and 40 percent yellowish brown (10YR 5/6) clay loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; common very fine roots; common very fine tubular pores; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common medium distinct grayish brown (10YR 5/2) redoximorphic depletions; about 2 percent subrounded fine gravel; slightly acid; gradual smooth boundary.

2Bt5—45 to 59 inches; about 60 percent yellowish brown (10YR 5/4) and 40 percent yellowish brown (10YR 5/6) clay loam; weak coarse prismatic structure parting to weak medium subangular blocky; firm; common very fine tubular pores; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine prominent black (10YR 2/1) manganese coatings on faces of peds; common medium distinct grayish brown (10YR 5/2) redoximorphic depletions; about 2 percent subrounded fine gravel; slightly acid; abrupt wavy boundary.

2BCk—59 to 74 inches; yellowish brown (10YR 5/6) clay loam; weak coarse prismatic structure; firm; common very fine tubular pores; common fine prominent very pale brown (10YR 8/2) carbonate masses; few fine prominent very pale brown (10YR 8/2) carbonate nodules; common medium prominent black (10YR 2/1) manganese

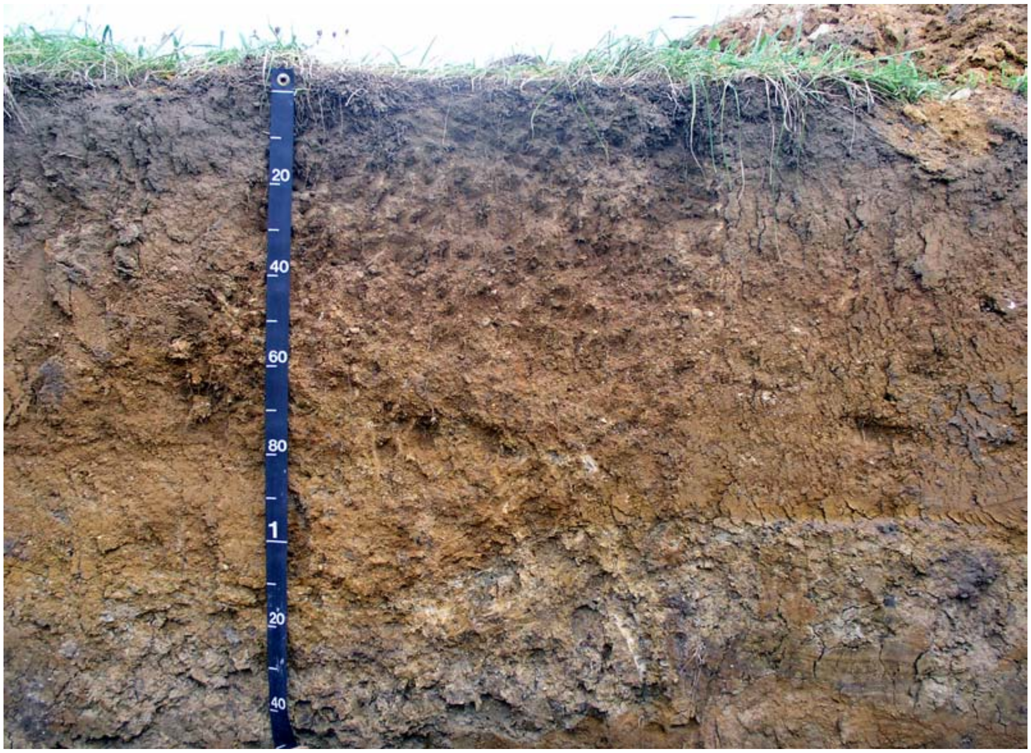

Figure 9.—Profile of an Adair soil. Depth is marked in centimeters.

coatings on faces of peds; many medium prominent grayish brown (10YR 5/2) redoximorphic depletions; about 2 percent subrounded fine gravel; strongly effervescent; slightly alkaline; clear smooth boundary.

2C—74 to 80 inches; about 50 percent yellowish brown (10YR 5/6) and 50 percent grayish brown (2.5Y 5/2) clay loam; massive; firm; common very fine tubular pores; common fine prominent black (10YR 2/1) manganese coatings; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; about 2 percent subrounded fine gravel; strongly effervescent; slightly alkaline.

Range in Characteristics

Depth to carbonates: 40 to 60 inches

Ap or A horizon:
Hue—7.5YR or 10YR
Value—2 or 3
Chroma—1 or 2
Texture—clay loam, silty clay loam, loam, or silt loam
Reaction—strongly acid to neutral
Content of rock fragments—2 to 10 percent

2Bt horizon:
Hue—2.5YR to 10YR
Value—3 to 5
Chroma—3 to 6
Texture—clay loam, clay, or silty clay
Reaction—strongly acid to neutral
Content of rock fragments—1 to 10 percent

2BCk horizon:
Hue—2.5YR to 2.5Y
Value—3 to 5
Chroma—2 to 6
Texture—clay loam
Reaction—slightly acid to moderately alkaline
Content of rock fragments—1 to 10 percent

2C horizon:
Hue—10YR
Value—4 or 5
Chroma—2 to 6
Texture—clay loam
Reaction—slightly acid to slightly alkaline
Content of rock fragments—1 to 10 percent

Taxadjunct features: The moderately eroded and severely eroded Adair soils in Cass County do not have surface horizons that meet the criteria for a Mollisol. These soils are classified as fine, smectitic, mesic Oxyaquic Vertic Hapludalfs.

Ankeny Series

Typical Pedon

Ankeny fine sandy loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain in Polk County, Iowa; about 1,320 feet west and 375 feet south of the northeast corner of sec. 13, T. 80 N., R. 22 W.; USGS Mitchellville (IA) topographic quadrangle; lat. 41 degrees 44 minutes 44 seconds N. and long. 93 degrees 21 minutes 12 seconds W.; NAD 83:

Ap—0 to 7 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; very friable; slightly acid; abrupt smooth boundary.

A1—7 to 14 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; very friable; slightly acid; gradual smooth boundary.

A2—14 to 24 inches; very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 3/2) kneaded, grayish brown (10YR 5/2) dry; weak fine granular and weak fine subangular blocky structure; very friable; slightly acid; gradual smooth boundary.

A3—24 to 30 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; some dark brown (10YR 3/3) peds in the lower part; weak fine subangular blocky and weak fine granular structure; very friable; slightly acid; gradual smooth boundary.

BA—30 to 38 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; very friable; very dark grayish brown (10YR 3/2) coatings on faces of peds; slightly acid; gradual smooth boundary.

Bw—38 to 44 inches; brown (10YR 4/3) fine sandy loam; weak medium and coarse subangular blocky structure; very friable; some dark brown (10YR 3/3) coatings on faces of peds; neutral; gradual smooth boundary.

2C1—44 to 50 inches; brown (10YR 4/3) loamy fine sand; single grain; loose; neutral; gradual smooth boundary.

2C2—50 to 60 inches; brown (10YR 5/3) loamy fine sand; single grain; loose; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 40 inches
Depth to carbonates: 60 to more than 80 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—fine sandy loam or sandy loam
Reaction—slightly acid or neutral

BA horizon:
Hue—10YR
Value—3
Chroma—2 or 3
Texture—fine sandy loam
Reaction—slightly acid or neutral

Bw horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—fine sandy loam or sandy loam
Reaction—slightly acid or neutral

2C horizon:
Hue—10YR
Value—4 or 5
Chroma—3 to 6
Texture—loamy fine sand, fine sand, loamy sand, or sand
Reaction—slightly acid to slightly alkaline

Arthur Series

Typical Pedon

Arthur silty clay loam, on a slope of 3 percent in a cultivated field on an upland in Ida County, Iowa; about 2,400 feet west and 150 feet north of the southeast corner of sec. 25, T. 87 N., R. 39 W.; USGS Odebolt West (IA) topographic quadrangle; lat. 42 degrees 18 minutes 45 seconds N. and long. 95 degrees 19 minutes 51 seconds W.; NAD 83:

Ap—0 to 6 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine and very fine granular structure; friable; few very fine roots; slightly acid; abrupt smooth boundary.

BA—6 to 11 inches; very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) silty clay loam, grayish brown (10YR 5/2) and brown (10YR 5/3) dry; weak fine and very fine subangular blocky structure; friable; few very fine roots; common very dark brown (10YR 2/2) wormcasts and surfaces lining pores and few brown (10YR 4/3) wormcasts; neutral; clear smooth boundary.

Bw1—11 to 17 inches; brown (10YR 4/3) silty clay loam; common dark brown (10YR 3/3) coatings on faces of peds; weak fine and very fine subangular blocky structure; friable; few very fine roots; common very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) wormcasts and surfaces lining pores; neutral; clear smooth boundary.

Bw2—17 to 24 inches; brown (10YR 4/3) silty clay loam; weak medium and fine subangular blocky structure; friable; few very fine roots; dark brown (10YR 3/3) on few faces of peds; neutral; clear wavy boundary.

Bw3—24 to 32 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium subangular blocky structure; friable; few very fine roots; common brown (10YR 4/3) coatings on faces of peds; neutral; clear wavy boundary.

2BC—32 to 40 inches; yellowish brown (10YR 5/4), stratified loamy sand, sand, and sandy loam; weak medium subangular blocky structure; very friable; very few very fine roots; neutral; clear wavy boundary.

2C1—40 to 72 inches; light yellowish brown (10YR 6/4), stratified sand and loamy sand; single grain; loose; very few very fine roots to a depth of 60 inches; few layers of brown (10YR 4/3 and 5/3) loam and silt loam 0.2 inch to 5 inches thick; neutral; clear wavy boundary.

2C2—72 to 80 inches; light yellowish brown (10YR 6/4), stratified sand and loamy sand; single grain; loose; slightly alkaline.

Range in Characteristics

Ap or A horizon:

Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—silty clay loam
Reaction—moderately acid to neutral

Bw horizon:

Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silty clay loam or silt loam
Reaction—slightly acid or neutral

2BC horizon:

Hue—10YR
Value—4 to 6
Chroma—3 to 6
Texture—stratified loamy sand, sand, and sandy loam
Reaction—neutral or slightly alkaline

2C horizon:

Hue—10YR
Value—4 to 6
Chroma—3 to 6
Texture—stratified sand and loamy sand; thin layers of material ranging from sandy loam to silt loam are common
Reaction—neutral or slightly alkaline

Taxadjunct features: The moderately eroded and severely eroded Arthur soils in Cass County do not have surface horizons that meet the criteria for a Mollisol. These soils are classified as fine-silty over sandy or sandy-skeletal, mixed, superactive, mesic Dystric Eutrudepts.

Bremer Series

Typical Pedon

Bremer silty clay loam, on a nearly level stream terrace in a cultivated field in Madison County, Iowa; about 645 feet north and 170 feet east of the southwest corner of sec.

12, T. 75 N., R. 28 W.; USGS Winterset (IA) topographic quadrangle; lat. 41 degrees 18 minutes 12 seconds N. and long. 94 degrees 01 minute 55 seconds W.; NAD 83:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine subangular blocky structure; friable; slightly acid; gradual smooth boundary.
A—8 to 19 inches; black (N 2/) silty clay loam, dark gray (10YR 4/1) dry; weak very fine subangular blocky structure; friable; slightly acid; gradual smooth boundary.
Bt—19 to 31 inches; very dark gray (N 3/) silty clay loam, very dark gray (10YR 3/1) kneaded, dark gray (10YR 4/1) dry; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; common distinct clay films on faces of peds; few brown (7.5YR 4/4) concretions; slightly acid; gradual smooth boundary.
Btg—31 to 42 inches; dark grayish brown (2.5Y 4/2) silty clay loam; weak medium prismatic structure parting to weak very fine and fine subangular blocky; firm; common distinct clay films on faces of peds; common dark gray (5Y 4/1) organic stains on faces of peds; few very dark gray (N 3/) coatings on faces of prisms; few fine dark concretions; few fine distinct light olive brown (2.5Y 5/4) redoximorphic concentrations; slightly acid; gradual smooth boundary.
BCg—42 to 50 inches; dark gray (10YR 4/1) silty clay loam; weak coarse angular blocky structure; firm; few roots; common distinct clay films on faces of peds and on surfaces of a few pores; few fine dark concretions; many medium faint dark grayish brown (2.5Y 4/2) and few fine distinct yellowish brown (10YR 5/4) redoximorphic concentrations; slightly acid; gradual smooth boundary.
Cg—50 to 60 inches; gray (5Y 5/1) silty clay loam; massive; firm; few fine dark concretions; common fine prominent yellowish brown (10YR 5/4) redoximorphic concentrations; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 36 inches
Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam
Reaction—moderately acid to neutral

Bt or Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 5
Chroma—1 or 2
Texture—silty clay loam or silty clay
Reaction—moderately acid to neutral

BCg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam
Reaction—moderately acid to neutral

Cg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 or 2

Texture—silty clay loam
Reaction—moderately acid to slightly alkaline

Burchard Series

Typical Pedon

Burchard clay loam, in an area of Shelby clay loam, MLRA 107B, 9 to 14 percent slopes, moderately eroded, in a grass pasture on a side slope in Cass County, Iowa; about 300 feet east and 1,190 feet south of the northwest corner of sec. 3, T. 77 N., R. 35 W.; USGS Exira East (IA) topographic quadrangle; lat. 41 degrees 30 minutes 04.7 seconds N. and long. 94 degrees 52 minutes 20.6 seconds W.; NAD 83:

A—0 to 2 inches; very dark gray (10YR 3/1) clay loam, gray (10YR 5/1) dry; moderate medium granular structure; friable; common very fine roots; slightly acid; clear smooth boundary.

Bt—2 to 12 inches; dark grayish brown (10YR 4/2) clay loam; moderate fine subangular blocky structure; friable; common very fine roots; few distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; abrupt smooth boundary.

Btk1—12 to 30 inches; light olive brown (2.5Y 5/4) clay loam; moderate fine subangular blocky structure; friable; common very fine roots; common distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; common fine prominent very pale brown (10YR 8/2) carbonate masses; about 3 percent rock fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

Btk2—30 to 43 inches; yellowish brown (10YR 5/6) clay loam; moderate fine angular blocky structure; friable; common very fine roots; common distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; common fine prominent very pale brown (10YR 8/2) carbonate masses; about 4 percent rock fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

C—43 to 80 inches; light brownish gray (2.5Y 6/2) clay loam; massive; firm; many coarse prominent yellowish brown (10YR 4/6) redoximorphic concentrations; about 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 12 to 30 inches

A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam, silt loam, or clay loam
Reaction—moderately acid to neutral

Bt horizon:
Hue—10YR
Value—3 to 6
Chroma—2 to 6
Texture—clay loam
Reaction—slightly acid or neutral

Btk horizon:
Hue—10YR or 2.5Y
Value—3 to 6
Chroma—2 to 6
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

C horizon:
Hue—10YR or 2.5Y
Value—6 or 7
Chroma—2 or 3
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

Taxadjunct features: The Burchard soils in Cass County have a surface layer that does not meet the requirements for a Mollisol. These soils are classified as fine-loamy, mixed, superactive, mesic Typic Hapludalfs.

Calco Series

Typical Pedon

Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain in Clay County, Iowa; about 650 feet east and 700 feet south of the northwest corner of sec. 16, T. 95 N., R. 35 W.; USGS Silver Lake (IA) topographic quadrangle; lat. 43 degrees 03 minutes 05 seconds N. and long. 94 degrees 59 minutes 25 seconds W.; NAD 83:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; few medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; common fine fragments of snail shells; slightly effervescent; slightly alkaline; clear smooth boundary.

A1—8 to 17 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; common medium black (10YR 2/1) wormcasts; slightly effervescent; slightly alkaline; gradual wavy boundary.

A2—17 to 31 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; friable; common medium black (10YR 2/1) wormcasts; slightly effervescent; moderately alkaline; gradual wavy boundary.

A3—31 to 42 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; friable; few fine prominent light brownish gray (2.5Y 6/2) redoximorphic depletions; slightly effervescent; moderately alkaline; gradual wavy boundary.

A4—42 to 50 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; friable; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bg—50 to 65 inches; very dark gray (N 3/) silty clay loam; weak fine and medium angular blocky structure parting to weak fine and medium subangular blocky; friable; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cg—65 to 80 inches; very dark gray (N 3/) silty clay loam; massive; friable; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 30 to more than 60 inches
Depth to carbonates: 0 to 10 inches

Ap or A horizon:
Hue—10YR, 5Y, or N
Value—2, 2.5, or 3
Chroma—0 or 1
Texture—silt loam or silty clay loam
Reaction—slightly alkaline or moderately alkaline

Bg horizon:

Hue—10YR, 2.5Y, 5Y, or N
Value—3 to 6
Chroma—0 to 2
Texture—silt loam or silty clay loam
Reaction—slightly alkaline or moderately alkaline

Cg horizon:

Hue—10YR, 2.5Y, 5Y, or N
Value—3 to 6
Chroma—0 to 3
Texture—silty clay loam, silt loam, or loam
Reaction—slightly alkaline or moderately alkaline

Clarinda Series

Typical Pedon

Clarinda silty clay loam (fig. 10), in an area of Lamoni-Clarinda-Shelby complex, 5 to 9 percent slopes, moderately eroded, in a cultivated field in the uplands in Adams County, Iowa; about 2,410 feet south and 1,650 feet west of the northeast corner of sec. 34, T. 71 N., R. 33 W.; USGS Corning South (IA) topographic quadrangle; lat. 40 degrees 54 minutes 28.8 seconds N. and long. 94 degrees 37 minutes 44.4 seconds W.; NAD 83:

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine granular structure; friable; many very fine roots; many very fine tubular pores; moderately acid; abrupt smooth boundary.

2Btg1—6 to 17 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate very fine subangular blocky structure; firm; many very fine roots; many very fine tubular pores; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very dark gray (10YR 3/1) organic stains on faces of peds; few fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; moderately acid; clear smooth boundary.

2Btg2—17 to 25 inches; grayish brown (2.5Y 5/2) silty clay; moderate fine prismatic structure parting to moderate fine and medium subangular blocky; very firm; common very fine roots; many very fine tubular pores; few distinct grayish brown (10YR 5/2) clay films on faces of peds; common distinct very dark gray (10YR 3/1) organic stains on all faces of peds; few fine prominent strong brown (7.5YR 4/6) and common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

2Btg3—25 to 39 inches; grayish brown (2.5Y 5/2) silty clay; moderate fine prismatic structure parting to moderate medium subangular blocky; very firm; many very fine tubular pores; few distinct clay films on all faces of peds; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

2Btg4—39 to 63 inches; grayish brown (2.5Y 5/2) silty clay; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm; many very fine tubular pores; few distinct grayish brown (10YR 5/2) clay films on faces of peds; few medium prominent strong brown (7.5YR 4/6) and common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; common fine faint light brownish gray (2.5Y 6/2) redoximorphic depletions on faces of peds; neutral; gradual smooth boundary.

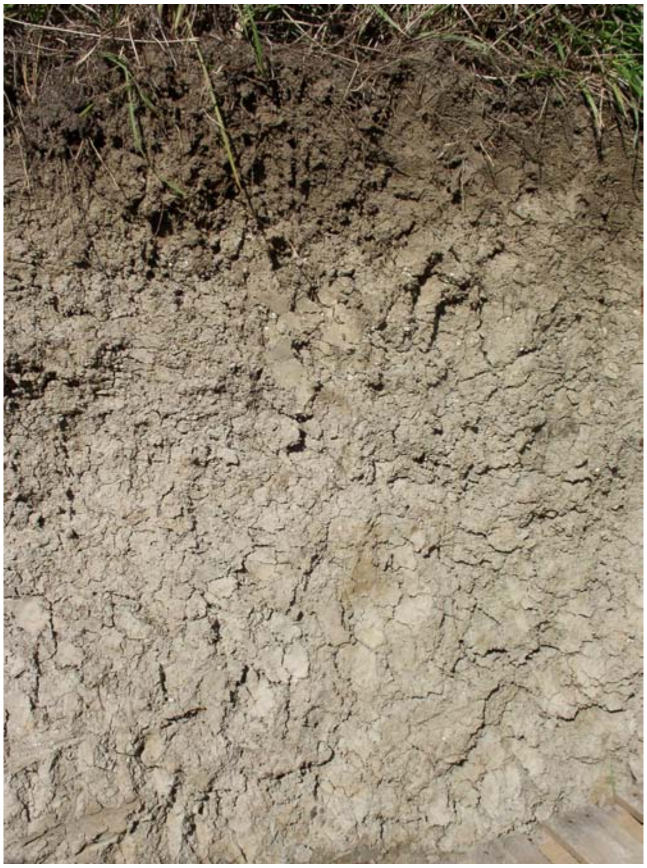

Figure 10.—Profile of a Clarinda soil.

2Btg5—63 to 80 inches; grayish brown (2.5Y 5/2) silty clay; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; very firm; common very fine tubular pores; few distinct grayish brown (10YR 5/2) clay films on all faces of peds; few fine prominent strong brown (7.5YR 4/6) and common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; common fine faint light brownish gray (2.5Y 6/2) redoximorphic depletions; neutral.

Range in Characteristics

Depth to carbonates: More than 60 inches
Content of rock fragments: 0 percent within a depth of 60 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam, silty clay loam, or silty clay
Reaction—strongly acid to neutral

2Btg horizon:
Hue—10YR to 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay or clay
Reaction—strongly acid to neutral

Taxadjunct features: The moderately eroded and severely eroded Clarinda soils in Cass County do not have surface horizons that meet the criteria for a Mollisol. The moderately eroded Clarinda soils are classified as fine, smectitic, mesic Vertic Epiaqualfs. The severely eroded Clarinda soils are classified as fine, smectitic, mesic Chromic Vertic Epiaqualfs.

Clearfield Series

Typical Pedon

Clearfield silty clay loam, on a slope of 6 percent in a cultivated field in the uplands in Union County, Iowa; about 1,400 feet south and 1,400 feet east of the northwest corner of sec. 21, T. 72 N., R. 30 W.; USGS Creston East (IA) topographic quadrangle; lat. 41 degrees 01 minute 29 seconds N. and long. 94 degrees 18 minutes 48 seconds W.; NAD 83:

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; common roots; slightly acid; abrupt smooth boundary.

A1—7 to 13 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine and very fine subangular blocky structure; friable; moderately acid; clear smooth boundary.

A2—13 to 17 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine subangular blocky structure; friable; few fine distinct yellowish brown (10YR 5/4) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Btg1—17 to 25 inches; dark gray (10YR 4/1) silty clay loam, dark grayish brown (2.5Y 4/2) kneaded; weak medium subangular blocky structure parting to weak fine subangular blocky; firm; common distinct very dark gray (10YR 3/1) clay films on faces of peds; black (10YR 2/1) coatings along surface of root channels and pores; few dark concretions (manganese oxides); many fine prominent reddish brown (2.5YR 4/4) redoximorphic concentrations; slightly acid; gradual smooth boundary.

Btg2—25 to 31 inches; olive gray (5Y 5/2) silty clay loam; moderate medium subangular blocky structure; firm; common distinct dark gray (5Y 4/1) clay films on faces of peds; few dark concretions (manganese oxides); common fine distinct dark gray (10YR 4/1) redoximorphic depletions; few fine prominent brown (7.5YR 4/4) and yellowish brown (10YR 5/6 and 5/8) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Btg3—31 to 39 inches; gray (5Y 5/1) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common distinct dark gray (5Y 4/1) clay films on faces of prisms; few medium faint gray (10YR 5/1) redoximorphic depletions; many medium prominent strong brown (7.5YR 5/6 and 5/8) redoximorphic concentrations; slightly acid; clear smooth boundary.

Bg1—39 to 48 inches; gray (5Y 6/1) silty clay loam; weak medium prismatic structure parting to weak fine subangular blocky; friable; a concentrated area of dark concretions (manganese oxides) in the upper 4 inches of the horizon; many medium prominent yellowish brown (10YR 5/4) redoximorphic concentrations; slightly acid; abrupt smooth boundary.

Bg2—48 to 54 inches; dark gray (N 4/) silty clay loam; weak medium subangular blocky structure; firm; few thin layers of gray (10YR 6/1) silty clay loam; few fine prominent brownish yellow (10YR 6/6), brown (7.5YR 4/4), and yellowish red (5YR 5/8) redoximorphic concentrations; moderately acid; abrupt smooth boundary.

2Abg—54 to 64 inches; black (10YR 2/1) silty clay loam; massive; dissected by few oblique fractures; firm; slightly acid; gradual smooth boundary.

2Bbg—64 to 71 inches; dark gray (10YR 4/1) silty clay; massive; firm; few fine faint dark grayish brown (10YR 4/2) redoximorphic concentrations; moderately acid.

Range in Characteristics

Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam
Reaction—moderately acid to neutral

Btg and Bg horizons:
Hue—10YR, 2.5Y, 5Y, or N
Value—4 to 6
Chroma—0 to 2
Texture—silty clay loam or silty clay
Reaction—moderately acid to neutral

2Ab horizon:
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay, silty clay loam, or clay
Reaction—strongly acid to slightly acid

2Bbg horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—4 to 6
Chroma—0 or 1
Texture—silty clay or clay
Reaction—strongly acid to slightly acid

Colo Series

Typical Pedon

Colo silt loam, overwash, in an area of Judson-Ackmore-Colo, overwash, complex, 1 to 5 percent slopes, in a cultivated field on a flood plain in Shelby County, Iowa; about 900 feet west and 70 feet south of the northeast corner of sec. 2, T. 79 N., R. 40 W.; USGS Panama (IA) topographic quadrangle; lat. 41 degrees 41 minutes 34 seconds N. and long. 95 degrees 27 minutes 47.3 seconds W.; NAD 83:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; common medium roots; few medium tubular pores; neutral; gradual smooth boundary.

A1—7 to 15 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common medium roots; common fine tubular pores; neutral; abrupt smooth boundary.

A2—15 to 40 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; few fine roots; common fine tubular pores; neutral; gradual smooth boundary.

BA—40 to 50 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak fine prismatic structure parting to weak medium subangular blocky; friable; common fine tubular pores; common fine faint gray (2.5Y 4/1) redoximorphic depletions; neutral; gradual smooth boundary.

Bg—50 to 70 inches; dark gray (2.5Y 4/1) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; few fine tubular pores; common fine and medium faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; common fine and medium prominent yellowish brown (10YR 5/4) redoximorphic concentrations; neutral; gradual smooth boundary.

BCg—70 to 80 inches; dark gray (2.5Y 4/1) silty clay loam; weak coarse prismatic structure; friable; few very fine tubular pores; common fine and medium faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; neutral.

Range in Characteristics

Thickness of the mollic epipedon: More than 36 inches
Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR to 5Y or N
Value—2 or 3
Chroma—0 to 2
Texture—silty clay loam or silt loam
Reaction—moderately acid to neutral

BA horizon:
Hue—10YR to 2.5Y or N
Value—2 or 3
Chroma—0 to 2
Texture—silty clay loam
Reaction—moderately acid to neutral

Bg horizon:
Hue—10YR or 2.5Y
Value—2 to 4
Chroma—1
Texture—silty clay loam
Reaction—moderately acid to neutral

BCg horizon:
Hue—10YR to 5Y
Value—3 to 6
Chroma—1 or 2
Texture—silty clay loam
Reaction—moderately acid to neutral

Corley Series

Typical Pedon

Corley silt loam, 0 to 2 percent slopes, in a cultivated field on a stream terrace in Mills County, Iowa; about 1,750 feet east and 300 feet north of the southwest corner of sec. 34, T. 72 N., R. 41 W.; USGS Tabor NE (IA) topographic quadrangle; lat. 40 degrees 59 minutes 24 seconds N. and long. 95 degrees 33 minutes 10 seconds W.; NAD 83:

Ap—0 to 10 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; strongly acid; clear smooth boundary.

A—10 to 18 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine subangular blocky structure parting to weak fine granular; friable; strongly acid; clear smooth boundary.

E—18 to 29 inches; dark gray (10YR 4/1) silt loam, light gray (10YR 7/1) dry; weak thick platy structure; friable; strongly acid; clear smooth boundary.

Bt—29 to 36 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; many distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Btg1—36 to 47 inches; dark gray (5Y 4/1) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; many distinct clay films on faces of peds; dark stains along root channels; moderately acid; gradual smooth boundary.

Btg2—47 to 60 inches; dark gray (5Y 4/1) silty clay loam; weak coarse prismatic structure parting to weak medium subangular blocky; firm; many distinct clay films on faces of peds; dark organic stains along root channels; few fine prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

Cg—60 to 68 inches; olive gray (5Y 5/2) silt loam; massive; friable; few fine prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; neutral.

Range in Characteristics

Depth to the argillic horizon: 14 to 32 inches
Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1
Texture—silt loam
Reaction—strongly acid to neutral

E horizon:
Hue—10YR
Value—4 or 5
Chroma—1 or 2
Texture—silt loam
Reaction—strongly acid to neutral

Bt horizon:
Hue—10YR, 5Y, or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam or silty clay
Reaction—strongly acid to slightly acid

Btg horizon:
Hue—10YR to 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam
Reaction—strongly acid to slightly acid

Cg horizon:
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

Dickinson Series

Typical Pedon

Dickinson fine sandy loam, on a convex slope of 3 percent in a cultivated field in the uplands in Mitchell County, Iowa; about 435 feet north and 180 feet east of the southwest corner of sec. 23, T. 100 N., R. 17 W.; USGS Stacyville (IA) topographic quadrangle; lat. 43 degrees 27 minutes 34 seconds N. and long. 92 degrees 49 minutes 47 seconds W.; NAD 83:

Ap—0 to 9 inches; very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; friable; neutral; abrupt smooth boundary.

A1—9 to 14 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; very friable; many distinct very dark brown (10YR 2/2) coatings on faces of peds; slightly acid; gradual smooth boundary.

A2—14 to 18 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; very friable; many distinct very dark grayish brown (10YR 3/2) coatings on faces of peds; moderately acid; clear smooth boundary.

Bw1—18 to 24 inches; brown (10YR 4/3) fine sandy loam; weak fine subangular blocky structure; very friable; many distinct dark brown (10YR 3/3) coatings on faces of peds; moderately acid; gradual smooth boundary.

Bw2—24 to 30 inches; brown (10YR 4/3) fine sandy loam; weak fine subangular blocky structure; very friable; moderately acid; clear smooth boundary.

BC—30 to 36 inches; yellowish brown (10YR 5/4) loamy sand; weak coarse prismatic structure; very friable; moderately acid; clear smooth boundary.

C—36 to 60 inches; yellowish brown (10YR 5/4) sand; single grain; loose; moderately acid.

Range in Characteristics

Thickness of the mollic epipedon: 12 to 20 inches
Depth to loamy sand and sand: 20 to 43 inches
Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—fine sandy loam, sandy loam, or loam
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—2 to 4
Texture—sandy loam or fine sandy loam
Reaction—strongly acid to slightly acid

BC and C horizons:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—3 to 6
Texture—loamy fine sand, loamy sand, fine sand, or sand
Reaction—moderately acid to neutral

2C horizon (where present, below a depth of 60 inches):
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 to 4
Texture—loam, clay loam, silt loam, silty clay loam, silty clay, or clay
Reaction—slightly alkaline or moderately alkaline

Taxadjunct features: The moderately eroded and severely eroded Dickinson soils in Cass County do not have surface horizons that meet the criteria for a Mollisol. These soils are classified as coarse-loamy, mixed, superactive, mesic Dystric Eutrudepts.

Dickman Series

Typical Pedon

Dickman fine sandy loam, loamy substratum, 9 to 14 percent slopes, moderately eroded, in a cultivated field in the uplands in Adams County, Iowa; about 2,125 feet west and 2,000 feet north of the southeast corner of sec. 29, T. 72 N., R. 33 W.; USGS Corning North (IA) topographic quadrangle; lat. 41 degrees 00 minutes 20 seconds N. and long. 94 degrees 40 minutes 04 seconds W.; NAD 83:

Ap—0 to 6 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; cloddy structure; very friable; moderately acid; abrupt smooth boundary.
Bw1—6 to 10 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; very friable; strongly acid; gradual wavy boundary.
Bw2—10 to 19 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; very friable; moderately acid; gradual wavy boundary.
Bw3—19 to 46 inches; yellowish brown (10YR 5/4) loamy fine sand; weak coarse subangular blocky structure; very friable; slightly acid; gradual wavy boundary.
Bw4—46 to 56 inches; yellowish brown (10YR 5/4) fine sandy loam; weak coarse subangular blocky structure; very friable; common fine distinct very dark brown (10YR 2/2) manganese masses; few fine distinct strong brown (7.5YR 5/6) redoximorphic concentrations; few fine distinct grayish brown (10YR 5/2) redoximorphic depletions; slightly acid; gradual wavy boundary.
BC1—56 to 69 inches; yellowish brown (10YR 5/6) fine sand; weak coarse subangular blocky structure; very friable; neutral; gradual wavy boundary.
2BC2—69 to 80 inches; yellowish brown (10YR 5/4) silt loam; weak coarse prismatic structure; firm; common faint brown (7.5YR 4/4) pressure faces on all faces of peds; many fine prominent black (10YR 2/1) manganese masses; few coarse distinct strong brown (7.5YR 4/6) redoximorphic concentrations; common coarse distinct grayish brown (2.5Y 5/2) redoximorphic depletions; neutral.

Range in Characteristics

Depth to carbonates: 30 inches or more

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—fine sandy loam or sandy loam
Reaction—moderately acid or slightly acid

Bw horizon:
Hue—7.5YR or 10YR
Value—3 to 5
Chroma—3 or 4

Texture—sandy loam or fine sandy loam
Reaction—strongly acid to slightly acid

BC horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—3 to 6
Texture—loamy fine sand, loamy sand, fine sand, or sand
Reaction—moderately acid to neutral

2BC horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral

Taxadjunct features: The moderately eroded Dickman soils in Cass County do not have surface horizons that meet the criteria for a Mollisol. These soils are classified as sandy, mixed, mesic Dystric Eutrudepts.

Ely Series

Typical Pedon

Ely silty clay loam, 2 to 5 percent slopes, in a cultivated field on a footslope in Keokuk County, Iowa; about 320 feet south and 1,120 feet west of the northeast corner of sec. 20, T. 77 N., R. 12 W.; USGS What Cheer (IA) topographic quadrangle; lat. 41 degrees 27 minutes 58 seconds N. and long. 92 degrees 15 minutes 47 seconds W.; NAD 83:

Ap—0 to 8 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; few fine roots; few fine vesicular pores; neutral; abrupt smooth boundary.

A1—8 to 15 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; few fine roots; few fine vesicular pores; neutral; clear smooth boundary.

A2—15 to 24 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; few fine roots; few fine vesicular pores; neutral; clear smooth boundary.

BA—24 to 32 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate very fine and fine subangular blocky structure; friable; few fine roots; few fine vesicular pores; few fine faint dark grayish brown (10YR 4/2) redoximorphic depletions; few fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; neutral; gradual smooth boundary.

Bg1—32 to 39 inches; dark grayish brown (10YR 4/2) silty clay loam; weak medium prismatic structure parting to weak fine and medium subangular blocky; friable; few fine roots; few fine vesicular pores; common dark gray (10YR 4/1) silt coatings on faces of peds; common distinct dark brown (10YR 3/3) organic coatings on faces of peds; few fine irregular masses of iron-manganese; few fine distinct yellowish brown (10YR 5/4) redoximorphic concentrations; slightly acid; gradual smooth boundary.

Bg2—39 to 47 inches; brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; few fine roots; few fine vesicular pores; common gray (10YR 5/1) silt coatings on faces of peds; few fine irregular masses of iron-manganese; common fine faint dark yellowish brown

(10YR 4/4) and yellowish brown (10YR 5/4) and few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

BCg—47 to 58 inches; grayish brown (10YR 5/2) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; few fine roots; few fine vesicular pores; few fine irregular masses of iron-manganese; few fine faint gray (10YR 5/1) redoximorphic depletions; common fine distinct yellowish brown (10YR 5/4) and common fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

Cg—58 to 80 inches; gray (10YR 5/1) and brown (10YR 5/3) silty clay loam; massive; friable; common fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; few fine irregular masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 36 inches
Depth to carbonates: More than 48 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

BA horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

Bg horizon (upper part):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—silty clay loam
Reaction—moderately acid to neutral

Bg horizon (lower part):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—silty clay loam
Reaction—moderately acid to neutral

Cg horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—silt loam, silty clay loam, loam, or clay loam
Reaction—moderately acid to neutral

Exira Series

Typical Pedon

Exira silty clay loam, 14 to 18 percent slopes, moderately eroded, in a cultivated field in the uplands in Shelby County, Iowa; about 2,600 feet east and 300 feet north of the southwest corner of sec. 29, T. 81 N., R. 37 W.; USGS Irwin (IA) topographic quadrangle; lat. 41 degrees 47 minutes 33.9 seconds N. and long. 95 degrees 10 minutes 49 seconds W.; NAD 83:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silty clay loam, brown (10YR 5/3) dry; weak fine granular structure; friable; common fine roots; common fine tubular pores; moderately acid; abrupt smooth boundary.

Bw1—6 to 15 inches; brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; friable; common very fine roots; common very fine tubular pores; common distinct very dark grayish brown (10YR 3/2) organic stains on faces of peds; common fine prominent strong brown (7.5YR 5/8) redoximorphic concentrations; common fine faint light brownish gray (10YR 5/2) redoximorphic depletions; slightly acid; gradual smooth boundary.

Bw2—15 to 28 inches; light olive brown (10YR 5/3) silty clay loam; weak fine prismatic structure parting to moderate fine subangular blocky; friable; common very fine roots; common very fine tubular pores; common distinct very dark grayish brown (10YR 3/2) organic stains on faces of peds; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; common fine faint light brownish gray (10YR 6/2) redoximorphic depletions; slightly acid; gradual smooth boundary.

BC—28 to 40 inches; light olive brown (2.5Y 5/3) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; common very fine tubular pores; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; common fine faint light brownish gray (10YR 6/2) redoximorphic depletions; neutral; gradual smooth boundary.

C1—40 to 60 inches; light olive brown (2.5Y 5/3) silt loam; massive; friable; common very fine tubular pores; many medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; many medium faint light brownish gray (10YR 6/2) redoximorphic depletions; neutral; gradual smooth boundary.

C2—60 to 80 inches; grayish brown (2.5Y 5/2) silt loam; massive; friable; common very fine tubular pores; many medium faint light brownish gray (10YR 6/2) redoximorphic depletions; many medium prominent strong brown (7.5YR 5/6) and common medium prominent yellowish red (5YR 5/6) redoximorphic concentrations; neutral.

Range in Characteristics

Depth to carbonates: More than 40 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—silty clay loam
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR
Value—3 to 5
Chroma—3
Texture—silty clay loam or silt loam
Reaction—moderately acid or slightly acid

BC horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 to 4

Texture—silty clay loam or silt loam
Reaction—moderately acid to neutral

C horizon:
Hue—7.5YR to 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral

Taxadjunct features: The Exira soils in Cass County have a surface layer that does not meet the requirements for a mollic epipedon. These soils are classified as fine-silty, mixed, superactive, mesic Dystric Eutrudepts.

Hesch Series

Typical Pedon

Hesch loam, deep, in an area of Shelby, sandy substratum-Hesch, deep-Hesch complex, 9 to 14 percent slopes, moderately eroded, in a cultivated field in the uplands in Cass County, Iowa; about 790 feet west and 2,400 feet south of the northeast corner of sec. 22, T. 75 N., R. 37 W.; USGS Lewis SW (IA) topographic quadrangle; lat. 41 degrees 16 minutes 53.9 seconds N. and long. 95 degrees 04 minutes 55.6 seconds W.; NAD 83:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to weak fine and very fine subangular blocky; friable; common fine roots; common fine tubular pores; slightly acid; abrupt smooth boundary.

Bt1—7 to 12 inches; dark yellowish brown (10YR 4/4) loam; moderate medium and fine subangular blocky structure; friable; few very fine roots; few fine tubular pores; common distinct brown (10YR 4/3) clay films on vertical faces of peds; common distinct very dark grayish brown (10YR 3/2) organic stains on vertical faces of peds; few fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations on faces of peds; moderately acid; clear smooth boundary.

Bt2—12 to 18 inches; brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; few very fine roots; few fine tubular pores; common distinct brown (10YR 4/3) clay films on vertical faces of peds; few distinct very dark grayish brown (10YR 3/2) organic stains on vertical faces of peds; common fine distinct strong brown (7.5YR 5/6) and common fine faint brown (10YR 5/4) redoximorphic concentrations on faces of peds; moderately acid; clear smooth boundary.

Bt3—18 to 30 inches; brown (7.5YR 5/4) fine sandy loam; moderate medium subangular blocky structure; firm; few very fine roots; few fine tubular pores; common distinct brown (10YR 4/3) clay films on vertical faces of peds; common fine distinct strong brown (7.5YR 5/6) and common fine faint light brown (7.5YR 6/3) redoximorphic concentrations on faces of peds; about 2 percent rock fragments; moderately acid; gradual smooth boundary.

Bt4—30 to 39 inches; brown (7.5YR 5/4) fine sandy loam; weak medium subangular blocky structure; very friable; few very fine roots; few fine tubular pores; common distinct brown (10YR 4/3) clay films on vertical faces of peds; common fine prominent light brown (7.5YR 6/3) and common fine faint yellowish red (5YR 5/6) redoximorphic concentrations on faces of peds; about 2 percent rock fragments; moderately acid; gradual wavy boundary.

BC—39 to 49 inches; yellowish red (5YR 4/6) loamy fine sand; single grain; loose; few very fine roots; few fine tubular pores; common fine prominent pink (7.5YR 7/3) and common fine distinct yellowish red (5YR 5/8) redoximorphic concentrations on faces of peds; moderately acid; clear wavy boundary.

2Cr—49 to 80 inches; yellowish red (5YR 4/6), poorly cemented sandstone; moderately acid.

Range in Characteristics

Depth to paralithic contact: 20 to 40 inches (more than 40 inches in the deep phase)

Ap or A horizon:
Hue—7.5YR or 10YR
Value—2 or 3
Chroma—1 to 3
Texture—sandy loam, fine sandy loam, or loam
Reaction—strongly acid to slightly acid

Bt horizon:
Hue—7.5YR or 10YR
Value—3 to 6
Chroma—3 to 6
Texture—typically fine sandy loam, sandy loam, or loam; thin subhorizons of sandy clay loam in some pedons
Reaction—strongly acid to slightly acid

BC horizon:
Hue—5YR to 10YR
Value—4 or 5
Chroma—5 or 6
Texture—sand, loamy sand, fine sand, or loamy fine sand
Reaction—very strongly acid to moderately acid

Taxadjunct features: The moderately eroded Hesch soils in Cass County do not have surface horizons that meet the criteria for a Mollisol. These soils are classified as coarse-loamy, mixed, active, mesic Mollic Hapludalfs.

Humeston Series

Typical Pedon

Humeston silty clay loam, in a nearly level area on bottom land, in a pasture in Wayne County, Iowa; about 2,520 feet south and 160 feet west of the northeast corner of sec. 31, T. 70 N., R. 22 W.; USGS Humeston (IA) topographic quadrangle; lat. 40 degrees 49 minutes 09.02 seconds N. and long. 93 degrees 25 minutes 22.88 seconds W.; NAD 83:

A—0 to 11 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

E1—11 to 16 inches; dark gray (10YR 4/1) silt loam, gray (10YR 6/1) dry; moderate medium platy structure; friable; common fine roots; few distinct gray (10YR 6/1) (dry) silt coatings on horizontal faces of peds; common distinct very dark gray (10YR 3/1) organic stains on horizontal faces of peds; common fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; moderately acid; clear smooth boundary.

E2—16 to 25 inches; dark gray (10YR 4/1) silt loam, gray (10YR 6/1) dry; strong thick platy structure; friable; common fine roots; common distinct light gray (10YR 7/1) (dry) silt coatings on horizontal faces of peds; few distinct very dark gray (10YR

3/1) organic stains on horizontal faces of peds; common fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; moderately acid; clear smooth boundary.

BE—25 to 30 inches; dark gray (10YR 4/1) silty clay loam; weak thin platy structure parting to moderate fine subangular blocky; friable; few distinct light gray (10YR 7/2) (dry) silt coatings on all faces of peds; few distinct very dark gray (10YR 3/1) organic stains on all faces of peds; common fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; moderately acid; clear smooth boundary.

Btg1—30 to 40 inches; very dark gray (10YR 3/1) silty clay loam; moderate fine subangular blocky structure; friable; common fine roots; common distinct black (10YR 2/1) organoargillans on all faces of peds; common fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; slightly acid; clear smooth boundary.

Btg2—40 to 51 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots throughout; common distinct black (10YR 2/1) organoargillans on all faces of peds; common fine prominent brown (7.5YR 4/4) redoximorphic concentrations; slightly acid; clear smooth boundary.

Btg3—51 to 62 inches; very dark gray (2.5Y 3/1) silty clay; weak fine prismatic structure parting to moderate fine angular blocky; firm; very few fine roots; few distinct black (10YR 2/1) organoargillans on all faces of peds; common fine faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; slightly acid; clear smooth boundary.

Btg4—62 to 72 inches; very dark gray (2.5Y 3/1) silty clay loam; moderate medium prismatic structure; firm; very few fine roots; few distinct black (10YR 2/1) organoargillans on vertical faces of peds; common fine faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; slightly acid; clear smooth boundary.

BCg—72 to 80 inches; dark grayish brown (2.5Y 4/2) silty clay loam; weak medium prismatic structure; firm; very few fine roots; very few distinct very dark gray (10YR 3/1) organoargillans on vertical faces of peds; many fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 18 inches
Depth to carbonates: More than 72 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1
Texture—silt loam or silty clay loam
Reaction—strongly acid to neutral

E horizon:
Hue—10YR
Value—3 to 5
Chroma—1
Texture—silt loam
Reaction—very strongly acid to moderately acid

BE horizon:
Hue—10YR
Value—2 to 4
Chroma—1

Texture—silty clay loam or silt loam
Reaction—very strongly acid to moderately acid

Btg horizon:
Hue—10YR to 5Y or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam or silty clay
Reaction—very strongly acid to slightly acid

BCg or Cg horizon (where present):
Hue—10YR to 5Y
Value—3 to 5
Chroma—1 or 2
Texture—silty clay loam
Reaction—very strongly acid to slightly acid

Judson Series

Typical Pedon

Judson silty clay loam, 2 to 5 percent slopes, in a cultivated field in the uplands in Adams County, Iowa; about 255 feet east and 250 feet south of the northwest corner of sec. 16, T. 71 N., R. 35 W.; USGS Villisca (IA) topographic quadrangle; lat. 40 degrees 57 minutes 29.1 seconds N. and long. 94 degrees 53 minutes 43.2 seconds W.; NAD 83:

Ap—0 to 7 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure parting to weak very fine subangular blocky; friable; common very fine roots; common very fine tubular pores; very strongly acid; abrupt smooth boundary.

A1—7 to 14 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; friable; common very fine roots; common very fine tubular pores; very many distinct black (10YR 2/1) organic stains on vertical faces of peds; very strongly acid; clear smooth boundary.

A2—14 to 24 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine prismatic structure parting to weak fine subangular blocky; friable; common very fine roots; common very fine tubular pores; many distinct very dark brown (10YR 2/2) organic stains on vertical faces of peds; moderately acid; gradual smooth boundary.

A3—24 to 33 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine prismatic structure parting to weak fine subangular blocky; friable; many very fine tubular pores; many distinct very dark brown (10YR 2/2) organic stains on vertical faces of peds; moderately acid; gradual smooth boundary.

AB—33 to 42 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 5/3) dry; moderate medium prismatic structure parting to weak fine and medium subangular blocky; friable; common very fine tubular pores; many distinct very dark grayish brown (10YR 3/2) organic stains on vertical faces of peds; moderately acid; clear smooth boundary.

Bw1—42 to 53 inches; brown (10YR 4/3) silty clay loam; moderate medium prismatic structure parting to weak fine and medium subangular blocky; friable; common very fine tubular pores; common distinct dark brown (10YR 3/3) organic stains on vertical faces of peds; few prominent light gray (10YR 7/2) silt coatings on vertical faces of peds; moderately acid; gradual smooth boundary.

Bw2—53 to 61 inches; brown (10YR 4/3) silty clay loam; moderate medium prismatic structure parting to weak medium subangular blocky; friable; common very fine tubular pores; common distinct dark brown (10YR 3/3) organic stains on vertical faces of peds; many prominent light gray (10YR 7/2) silt coatings on vertical faces of peds; slightly acid; gradual smooth boundary.

Bw3—61 to 70 inches; brown (10YR 4/3) silty clay loam; moderate medium prismatic structure parting to weak medium and coarse subangular blocky; friable; common very fine tubular pores; many prominent light gray (10YR 7/2) silt coatings on vertical faces of peds; moderately acid; gradual smooth boundary.

Bw4—70 to 78 inches; brown (10YR 4/3) silty clay loam; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; common very fine tubular pores; few prominent light gray (10YR 7/2) silt coatings on vertical faces of peds; slightly acid; gradual smooth boundary.

BC—78 to 80 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak coarse prismatic structure; friable; common very fine tubular pores; very few distinct light gray (10YR 7/2) silt coatings on vertical faces of peds; few medium faint yellowish brown (10YR 5/4) redoximorphic concentrations; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 32 to 60 inches
Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam
Reaction—very strongly acid to neutral

AB horizon:
Hue—10YR
Value—2 or 3
Chroma—2 or 3
Texture—silty clay loam
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR
Value—3 to 5
Chroma—3 to 5
Texture—silty clay loam
Reaction—moderately acid to neutral

BC horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam or silt loam
Reaction—slightly acid to slightly alkaline

Kennebec Series

Typical Pedon

Kennebec silt loam, in an area of Nodaway-Kennebec complex, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain in Adams County, Iowa; about 760 feet west and 750 feet north of the southeast corner of sec. 31, T. 71 N., R. 35 W.;

USGS Villisca (IA) topographic quadrangle; lat. 40 degrees 54 minutes 07 seconds N. and long. 94 degrees 54 minutes 46 seconds W.; NAD 83:

Ap—0 to 7 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; common fine roots; common fine tubular pores; slightly acid; abrupt smooth boundary.

A—7 to 16 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; common very fine roots; common very fine tubular pores; moderately acid; gradual smooth boundary.

Bw1—16 to 25 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak fine prismatic structure parting to weak fine subangular blocky; friable; common very fine roots; many very fine tubular pores; very many distinct very dark brown (10YR 2/2) organic stains on vertical faces of peds; slightly acid; gradual smooth boundary.

Bw2—25 to 35 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak medium prismatic structure parting to weak fine subangular blocky; friable; many very fine tubular pores; many distinct very dark brown (10YR 2/2) organic stains on vertical faces of peds; slightly acid; gradual smooth boundary.

Bw3—35 to 48 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak medium prismatic structure parting to weak fine and medium subangular blocky; friable; many very fine tubular pores; many distinct very dark brown (10YR 2/2) organic stains on vertical faces of peds; neutral; gradual smooth boundary.

BC—48 to 59 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak coarse prismatic structure; friable; many very fine tubular pores; neutral; clear smooth boundary.

C—59 to 80 inches; very dark grayish brown (10YR 3/2) silt loam; massive; friable; many very fine tubular pores; few fine distinct olive brown (2.5Y 4/4) redoximorphic concentrations; neutral.

Range in Characteristics

Thickness of the mollic epipedon: More than 40 inches
Depth to carbonates: More than 80 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR
Value—2 to 4
Chroma—2 or 3
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral

BC or C horizon:
Hue—10YR or 2.5Y
Value—2 to 4
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral

Lamoni Series

Typical Pedon

Lamoni silty clay loam, in an area of Lamoni-Shelby complex, 9 to 14 percent slopes, moderately eroded, in a cultivated field on a side slope in Adams County, Iowa; about 2,250 feet east and 2,400 feet north of the southwest corner of sec. 32, T. 72 N., R. 33 W.; USGS Corning South (IA) topographic quadrangle; lat. 40 degrees 59 minutes 29.2 seconds N. and long. 94 degrees 40 minutes 17.8 seconds W.; NAD 83:

Ap—0 to 6 inches; about 70 percent black (10YR 2/1) and 30 percent dark grayish brown (10YR 4/2) silty clay loam, gray (10YR 5/1) dry; moderate fine subangular blocky structure parting to weak very fine subangular blocky; friable; common very fine roots; common fine tubular pores; about 1 percent subrounded fine gravel; moderately acid; gradual smooth boundary.

2Btg1—6 to 9 inches; dark grayish brown (10YR 4/2) clay; moderate fine subangular blocky structure; firm; common very fine roots; common very fine tubular pores; common distinct dark gray (10YR 4/1) clay films; common distinct black (10YR 2/1) organic stains on surfaces along root channels; few fine distinct brown (7.5YR 4/4) redoximorphic concentrations; about 2 percent subrounded fine gravel; slightly acid; gradual smooth boundary.

2Btg2—9 to 16 inches; grayish brown (2.5Y 5/2) clay; moderate fine subangular blocky structure; firm; common very fine roots; common very fine pores; common distinct dark grayish brown (10YR 4/2) clay films; few distinct black (10YR 2/1) organic stains on surfaces along root channels; few fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; about 3 percent subrounded fine gravel; slightly acid; gradual smooth boundary.

2Bt1—16 to 23 inches; olive brown (2.5Y 4/3) clay; weak medium subangular blocky structure parting to moderate fine subangular blocky; firm; common very fine roots; common very fine pores; common distinct brown (10YR 5/3) clay films; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; about 3 percent subrounded fine and medium gravel; slightly acid; gradual smooth boundary.

2Bt2—23 to 29 inches; yellowish brown (10YR 5/4) clay loam; moderate fine prismatic structure parting to weak fine subangular blocky; firm; common very fine roots; common very fine pores; common distinct gray (10YR 5/1) and grayish brown (10YR 5/2) clay films; common fine prominent black (10YR 2/1) manganese masses; common fine prominent yellowish brown (10YR 5/8) redoximorphic concentrations; common fine distinct grayish brown (2.5Y 5/2) redoximorphic depletions; about 3 percent subrounded fine gravel; slightly acid; gradual smooth boundary.

2Bt3—29 to 42 inches; about 70 percent light brownish gray (2.5Y 6/2) and 30 percent yellowish brown (10YR 5/6) clay loam; weak fine prismatic structure parting to moderate fine subangular blocky; firm; common very fine pores; common distinct gray (2.5Y 5/1) clay films; few faint pinkish gray (7.5YR 6/2) redoximorphic concentrations; common fine prominent yellowish brown (10YR 5/6) and many medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations; about 3 percent subrounded medium gravel; slightly acid; gradual smooth boundary.

2Bt4—42 to 55 inches; about 55 percent light brownish gray (2.5Y 6/2) and 45 percent yellowish brown (10YR 5/6) clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; common very fine pores; common distinct brown (10YR 5/3) clay films; few fine prominent black (10YR 2/1) manganese masses; many medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations; about 3 percent subrounded fine and medium gravel; neutral; gradual smooth boundary.

2BC—55 to 69 inches; about 60 percent light brownish gray (2.5Y 6/2) and 40 percent yellowish brown (10YR 5/6) clay loam; weak medium prismatic structure; firm; common very fine pores; few fine prominent black (10YR 2/1) manganese masses; many medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations; about 3 percent subrounded fine and medium gravel; neutral; gradual smooth boundary.

2C—69 to 80 inches; light olive brown (2.5Y 5/4) clay loam; massive; firm; common very fine pores; few fine prominent white (10YR 8/1) carbonate masses; common fine distinct light brownish gray (2.5Y 6/2) redoximorphic depletions; common medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; about 3 percent subrounded fine and medium gravel; neutral.

Range in Characteristics

Depth to carbonates: More than 48 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam or clay loam
Reaction—strongly acid to neutral

2Bt horizon (upper part):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—clay loam or clay
Reaction—strongly acid to neutral

2Bt horizon (lower part):
Hue—10YR to 5Y
Value—5 or 6
Chroma—1 to 6
Texture—clay loam
Reaction—strongly acid to neutral

2BC horizon:
Hue—10YR to 5Y
Value—5 or 6
Chroma—1 to 6
Texture—clay loam
Reaction—slightly acid or neutral

2C horizon:
Hue—10YR to 5Y
Value—4 to 6
Chroma—1 to 6
Texture—clay loam
Reaction—slightly acid to slightly alkaline

Taxadjunct features: The moderately eroded and severely eroded Lamoni soils in Cass County do not have surface horizons that meet the criteria for a Mollisol. The moderately eroded Lamoni soils are classified as fine, smectitic, mesic Vertic Epiaqualfs. The severely eroded Lamoni soils are classified as fine, smectitic, mesic Chromic Vertic Epiaqualfs.

Liston Series

Typical Pedon

Liston clay loam, in an area of Liston-Burchard complex, 9 to 14 percent slopes, moderately eroded, in a wooded pasture in the uplands in Shelby County, Iowa; 950 feet west and 1,450 feet south of the northeast corner of sec. 35, T. 78 N., R. 39 W.; USGS Corley topographic quadrangle; lat. 41 degrees 31 minutes 00.1 second N. and long. 95 degrees 17 minutes 35.3 seconds W.; NAD 83:

A—0 to 7 inches; very dark grayish brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common fine roots; common fine tubular pores; about 2 percent fine gravel; neutral; abrupt smooth boundary.

Bw—7 to 16 inches; brown (10YR 4/3) clay loam; moderate fine subangular blocky structure; firm; common fine roots; common fine tubular pores; common distinct very dark grayish brown (10YR 3/2) organic stains on faces of peds; common fine distinct yellowish brown (10YR 5/6) relict redoximorphic concentrations; common fine faint dark grayish brown (10YR 4/2) relict redoximorphic depletions; about 1 percent fine gravel; slightly effervescent; slightly alkaline; gradual smooth boundary.

Bk1—16 to 23 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine subangular blocky structure; firm; common fine roots; common fine tubular pores; few distinct dark brown (10YR 3/3) organic stains on faces of peds; common fine and coarse prominent very pale brown (10YR 8/2) carbonate masses; common fine distinct strong brown (7.5YR 5/6) relict redoximorphic concentrations; common fine distinct grayish brown (2.5Y 5/2) relict redoximorphic depletions; about 2 percent fine gravel; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk2—23 to 32 inches; yellowish brown (10YR 5/4) clay loam; moderate fine prismatic structure parting to moderate fine and medium subangular blocky; firm; few fine roots; few fine tubular pores; common fine prominent very pale brown (10YR 8/2) carbonate masses; common fine distinct strong brown (7.5YR 5/6) relict redoximorphic concentrations; about 2 percent fine gravel; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk3—32 to 43 inches; yellowish brown (10YR 5/4) clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; few fine tubular pores; common fine prominent very pale brown (10YR 8/2) carbonate masses; common fine distinct strong brown (7.5YR 5/6) relict redoximorphic concentrations; common fine distinct grayish brown (2.5Y 5/2) relict redoximorphic depletions; about 3 percent fine gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—43 to 52 inches; grayish brown (2.5Y 5/2) clay loam; massive; firm; common fine and medium prominent very pale brown (10YR 8/2) carbonate masses; common fine prominent yellowish red (5YR 4/6) relict redoximorphic concentrations; about 2 percent fine gravel; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2—52 to 62 inches; grayish brown (2.5Y 5/2) clay loam; massive; firm; common fine prominent very pale brown (10YR 8/2) carbonate masses; common coarse distinct yellowish brown (10YR 5/4) relict redoximorphic concentrations; about 3 percent fine gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

C3—62 to 76 inches; about 60 percent yellowish brown (10YR 5/4) and 40 percent grayish brown (2.5Y 5/2) clay loam; massive; firm; common fine prominent very pale brown (10YR 8/2) carbonate masses; common medium distinct strong brown (7.5YR 4/6) relict redoximorphic concentrations; about 2 percent fine gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

C4—76 to 80 inches; grayish brown (2.5Y 5/2) clay loam; massive; firm; few fine prominent very pale brown (10YR 8/2) carbonate masses; common medium prominent yellowish brown (10YR 5/6) relict redoximorphic concentrations; about 2 percent fine gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 0 to 10 inches

A or Ap horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam or clay loam
Reaction—neutral to moderately alkaline

Bw horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—3 or 4
Texture—clay loam
Reaction—slightly alkaline or moderately alkaline

Bk horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—clay loam
Reaction—slightly alkaline or moderately alkaline

C horizon:
Hue—7.5YR to 5Y
Value—4 to 6
Chroma—1 to 6
Texture—clay loam
Reaction—slightly alkaline or moderately alkaline

Macksburg Series

Typical Pedon

Macksburg silty clay loam, 0 to 2 percent slopes, in a cultivated field in the uplands in Adams County, Iowa; about 125 feet east and 500 feet north of the southwest corner of sec. 6, T. 71 N., R. 32 W.; USGS Lenox (IA) topographic quadrangle; lat. 40 degrees 58 minutes 22.4 seconds N. and long. 94 degrees 35 minutes 05.9 seconds W.; NAD 83:

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; common fine roots; common very fine tubular pores; neutral; abrupt smooth boundary.

A—7 to 16 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine subangular blocky structure parting to moderate fine granular; friable; common fine roots; many very fine tubular pores; slightly acid; clear smooth boundary.

BA—16 to 22 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate very fine subangular blocky structure; friable; common very fine roots; many very fine tubular pores; moderately acid; clear smooth boundary.

Bt1—22 to 30 inches; about 70 percent dark grayish brown (2.5Y 4/2) and 30 percent olive brown (2.5Y 4/3) silty clay loam; moderate fine prismatic structure parting to moderate fine and very fine subangular blocky; firm; common very fine roots; many very fine tubular pores; many distinct very dark grayish brown (2.5Y 3/2) clay films on vertical faces of peds; moderately acid; gradual smooth boundary.

Bt2—30 to 37 inches; about 50 percent grayish brown (2.5Y 5/2) and 50 percent light olive brown (2.5Y 5/4) silty clay; moderate medium prismatic structure parting to moderate fine and very fine subangular blocky; firm; common very fine roots; many very fine tubular pores; many distinct dark grayish brown (2.5Y 4/2) clay films on vertical faces of peds; common fine and medium prominent strong brown (7.5YR 4/6) redoximorphic concentrations; moderately acid; clear smooth boundary.

Btg1—37 to 46 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; common fine roots; many very fine tubular pores; few distinct dark grayish brown (2.5Y 4/2) clay films on vertical faces of peds; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

Btg2—46 to 55 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; many very fine tubular pores; few distinct dark grayish brown (2.5Y 4/2) clay films on vertical faces of peds; few strong brown (7.5YR 5/6) redoximorphic concentrations; neutral; gradual smooth boundary.

BCg—55 to 64 inches; grayish brown (2.5Y 5/2) silty clay loam; weak medium prismatic structure; friable; many very fine tubular pores; many medium prominent strong brown (7.5YR 5/6) redoximorphic concentrations; neutral; gradual smooth boundary.

Cg1—64 to 71 inches; grayish brown (2.5Y 5/2) silty clay loam; massive; friable; many very fine pores; many medium prominent strong brown (7.5YR 5/6) redoximorphic concentrations; neutral; gradual wavy boundary.

Cg2—71 to 80 inches; light brownish gray (2.5Y 6/2) silt loam; massive; friable; many very fine tubular pores; many medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 16 to 28 inches
Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR
Value—2
Chroma—1 or 2
Texture—silty clay loam
Reaction—moderately acid to neutral

BA horizon:
Hue—10YR
Value—3
Chroma—2
Texture—silty clay loam
Reaction—moderately acid to neutral

Bt or Btg horizon:
Hue—10YR or 2.5Y in the upper part; 2.5Y or 5Y in the lower part
Value—4 to 6
Chroma—2 to 4
Texture—silty clay or silty clay loam
Reaction—strongly acid to neutral

BCg horizon:
Hue—7.5YR to 5Y
Value—4 to 6
Chroma—1 to 6
Texture—silty clay loam
Reaction—slightly acid or neutral

Cg horizon:
Hue—7.5YR to 5Y
Value—4 to 6
Chroma—1 to 6
Texture—silty clay loam or silt loam
Reaction—slightly acid or neutral

Marshall Series

Typical Pedon

Marshall silty clay loam (fig. 11), 2 to 5 percent slopes, in a cultivated field in the uplands in Cass County, Iowa; about 1,000 feet west and 200 feet south of the northeast corner of sec. 31, T. 77 N., R. 36 W.; USGS Atlantic (IA) topographic quadrangle; lat. 41 degrees 25 minutes 54.2 seconds N. and long. 95 degrees 01 minute 34.8 seconds W.; NAD 83:

Ap—0 to 6 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; friable; common fine roots; common fine irregular pores; moderately acid; abrupt smooth boundary.

A—6 to 11 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate very fine subangular blocky structure parting to moderate very fine granular; friable; common very fine roots; common very fine tubular pores; moderately acid; clear smooth boundary.

AB—11 to 16 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; common very fine roots; common very fine tubular pores; many distinct very dark brown (10YR 2/2) organic stains on vertical faces of peds; slightly acid; clear smooth boundary.

Bw1—16 to 26 inches; brown (10YR 4/3) silty clay loam; moderate fine prismatic structure parting to moderate fine subangular blocky; friable; common very fine roots; common very fine tubular pores; common distinct dark brown (10YR 3/3) organic stains on vertical faces of peds; slightly acid; gradual smooth boundary.

Bw2—26 to 35 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure; friable; common very fine roots; common very fine tubular pores; slightly acid; gradual smooth boundary.

Bw3—35 to 46 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak coarse subangular blocky structure; friable; common very fine roots; many very fine tubular pores; common fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; common fine distinct irregular grayish brown (2.5Y 5/2) redoximorphic depletions; slightly acid; gradual smooth boundary.

BC—46 to 56 inches; brown (10YR 5/3) silty clay loam; weak coarse prismatic structure; friable; common very fine roots; common very fine tubular pores; common fine faint grayish brown (2.5Y 5/2) redoximorphic depletions; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations on faces of peds; slightly acid; gradual smooth boundary.

C—56 to 69 inches; brown (10YR 5/3) silty clay loam; massive; friable; common very fine roots; common very fine tubular pores; common fine distinct yellowish brown

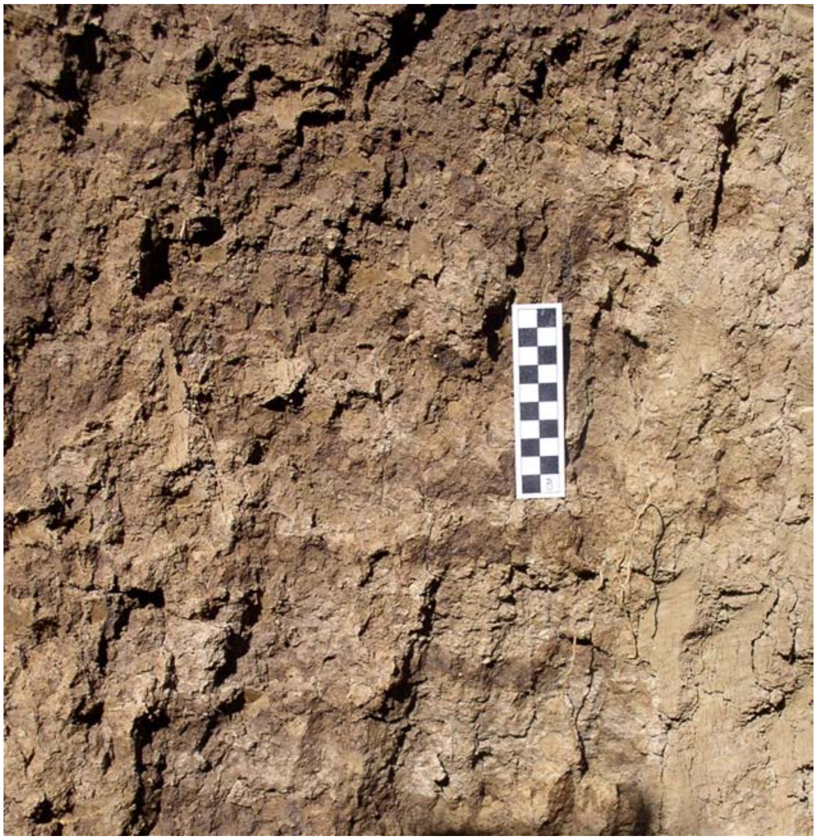

Figure 11.—Profile of a Marshall soil. Each square on the marker equals 1 cm^2.

(10YR 5/6) redoximorphic concentrations; common fine faint grayish brown (10YR 5/2) redoximorphic depletions; slightly acid; clear smooth boundary.

Cg—69 to 79 inches; grayish brown (2.5Y 5/2) silty clay loam; massive; friable; common very fine roots; common very fine tubular pores; common fine prominent black (10YR 2/1) spherical iron-manganese nodules; many fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 24 inches
Depth to relict redoximorphic features: More than 30 inches
Depth to carbonates: More than 71 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2; 2 in pedons that have value of 3
Texture—silty clay loam or silt loam
Reaction—moderately acid to neutral

AB horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture—silty clay loam
Reaction—moderately acid or slightly acid

Bw horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam
Reaction—moderately acid or slightly acid

BC, C, or Cg horizon:
Hue—10YR to 5Y
Value—4 or 5
Chroma—2 to 6
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral

Taxadjunct features: The moderately eroded and severely eroded Marshall soils in Cass County do not have surface horizons that meet the criteria for a Mollisol. These soils are classified as fine-silty, mixed, superactive, mesic Dystric Eutrudepts.

Melia Series

Typical Pedon

Melia silty clay loam, terrace, 0 to 2 percent slopes, in a cultivated field on a stream terrace in Cass County, Iowa; about 2,555 feet east and 1,072 feet south of the northwest corner of sec. 25, T. 76 N., R. 37 W.; USGS Lewis (IA) topographic quadrangle; lat. 41 degrees 21 minutes 27 seconds N. and long. 95 degrees 03 minutes 06.8 seconds W.; NAD 83:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; friable; few fine roots; few fine tubular pores; neutral; abrupt smooth boundary.

A—8 to 30 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; friable; few fine roots; common fine tubular pores; neutral; clear wavy boundary.

Bw1—30 to 36 inches; brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; many very fine tubular pores; neutral; gradual smooth boundary.

Bw2—36 to 48 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; many very fine tubular pores; common fine distinct grayish brown (2.5Y 5/2) redoximorphic depletions; neutral; gradual smooth boundary.

C—48 to 80 inches; yellowish brown (10YR 5/4) silt loam; massive; very friable; few fine roots; many fine and very fine tubular pores; common medium distinct light brownish gray (10YR 6/2) redoximorphic depletions; many medium distinct strong brown (7.5YR 4/6) redoximorphic concentrations; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 20 inches or more
Depth to relict redoximorphic features: More than 30 inches
Depth to carbonates: More than 50 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2

Texture—silty clay loam or silt loam
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam or silt loam
Reaction—moderately acid to slightly alkaline

C horizon:
Hue—10YR
Value—4 or 5
Chroma—2 to 6
Texture—silt loam or silty clay loam
Reaction—slightly acid to slightly alkaline

Minden Series

Typical Pedon

Minden silty clay loam, in an area of Corley-Minden complex, terrace, 0 to 2 percent slopes, in a cultivated field on a stream terrace in Cass County, Iowa; about 380 feet north and 1,560 feet west of the southeast corner of sec. 31, T. 75 N., R. 37 W.; USGS Griswold (IA) topographic quadrangle; lat. 41 degrees 14 minutes 46 seconds N. and long. 95 degrees 08 minutes 32 seconds W.; NAD 83:

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine granular structure; friable; many very fine roots; many very fine tubular pores; moderately acid; clear smooth boundary.

A1—7 to 15 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; many very fine roots; many very fine tubular pores; moderately acid; gradual smooth boundary.

A2—15 to 22 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure parting to weak medium granular; friable; common very fine roots; common very fine tubular pores; moderately acid; gradual smooth boundary.

Bg1—22 to 32 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine subangular blocky structure; friable; common very fine roots; common very fine tubular pores; few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Bg2—32 to 40 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate fine and medium subangular blocky structure; friable; few very fine roots; common very fine tubular pores; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Bg3—40 to 48 inches; grayish brown (2.5Y 5/2) silty clay loam; weak fine prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; common very fine tubular pores; many coarse distinct yellowish brown (10YR 5/4) and many coarse prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Bg4—48 to 58 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium subangular blocky structure; friable; common coarse distinct yellowish brown (10YR 5/4) and common coarse prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

BCg—58 to 67 inches; grayish brown (2.5Y 5/2) silty clay loam; weak coarse subangular blocky structure; friable; common coarse distinct yellowish brown (10YR 5/4) and common coarse prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Cg—67 to 80 inches; grayish brown (2.5Y 5/2) silt loam; massive; friable; common coarse distinct yellowish brown (10YR 5/4) and common coarse prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 30 inches
Depth to carbonates: More than 72 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

BA horizon (where present):
Hue—10YR
Value—3
Chroma—2 or 3
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

Bg horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—silty clay loam
Reaction—moderately acid to neutral

BCg horizon:
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—2 to 6
Texture—silty clay loam
Reaction—moderately acid to neutral

Cg horizon:
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—2 to 6
Texture—silt loam
Reaction—moderately acid to neutral

Mt. Sterling Series

Typical Pedon

Mt. Sterling silt loam, in an area of Zook-Mt. Sterling complex, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain in Adams County, Iowa; about 2,450 feet east and 1,250 feet south of the northwest corner of sec. 21, T. 73 N., R. 34 W.; USGS Carbon (IA) topographic quadrangle; lat. 41 degrees 06 minutes 44 seconds N. and long. 94 degrees 46 minutes 03 seconds W.; NAD 83:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure parting to weak fine granular; friable; common very fine roots; common very fine tubular pores; neutral; clear smooth boundary.

C—8 to 37 inches; stratified, about 80 percent very dark gray (10YR 3/1) and 20 percent dark grayish brown (10YR 4/2) silt loam; massive with weak thin alluvial stratification; common very fine roots; common very fine tubular pores; many medium prominent dark brown (7.5YR 3/4) redoximorphic concentrations; neutral; clear smooth boundary.

2Ab1—37 to 42 inches; black (N 2/) silty clay loam; moderate fine subangular blocky structure; firm; few very fine roots; common very fine tubular pores; neutral; gradual smooth boundary.

2Ab2—42 to 54 inches; black (N 2/) silty clay loam; moderate medium subangular blocky structure; firm; few very fine roots; many very fine tubular pores; neutral; gradual smooth boundary.

2Ab3—54 to 62 inches; black (N 2/) silty clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; few very fine roots; many very fine tubular pores; neutral; gradual smooth boundary.

2Ab4—62 to 80 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium prismatic structure; firm; few very fine roots; many very fine tubular pores; neutral.

Range in Characteristics

Depth to a buried horizon: 20 to 40 inches
Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam
Reaction—moderately acid to neutral

C horizon:
Hue—10YR
Value—2 to 6
Chroma—1 or 2
Texture—silt loam
Reaction—moderately acid to neutral

Ab horizon:
Hue—10YR or N
Value—2 to 4
Chroma—0 or 1
Texture—silty clay loam
Reaction—very strongly acid to neutral

Munterville Series

Typical Pedon

Munterville silt loam, on a north-facing slope of 19 percent in a wooded pasture in Wapello County, Iowa; about 400 feet west and 1,800 feet south of the northeast corner of sec. 21, T. 72 N., R. 15 W.; USGS Chillicothe (IA) topographic quadrangle; lat. 41 degrees 01 minute 33.8 seconds N. and long. 92 degrees 35 minutes 02.0 seconds W.; NAD 83:

A—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; friable; many fine roots; common distinct very dark gray (10YR 3/1) organic stains on faces of peds; slightly acid; clear smooth boundary.

E—4 to 8 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; moderate medium platy structure; friable; many fine roots; few distinct very dark grayish brown (10YR 3/2) organic stains on horizontal faces of peds; slightly acid; clear smooth boundary.

Bt1—8 to 17 inches; brown (10YR 5/3) silty clay loam; moderate fine subangular blocky structure; friable; common roots; common distinct grayish brown (10YR 5/2) clay films on all faces of peds; few light gray (10YR 7/2) (dry) silt coatings on all faces of peds; slightly acid; abrupt smooth boundary.

2Bt2—17 to 22 inches; light olive brown (2.5Y 5/3) silty clay; moderate medium subangular blocky structure; firm; common fine roots; common distinct dark grayish brown (2.5Y 4/2) clay films on all faces of peds; few light gray (10YR 7/2) (dry) silt coatings on all faces of peds; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly acid; gradual smooth boundary.

2Bt3—22 to 34 inches; grayish brown (2.5Y 5/2) clay; weak medium angular blocky structure; firm; common fine roots; common distinct dark gray (2.5Y 4/1) clay films on all faces of peds; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly acid; gradual smooth boundary.

2BC—34 to 47 inches; gray (N 5/) silty clay; weak medium prismatic structure; firm; common fine roots; few white (10YR 8/1) (dry) sand grains on vertical faces of peds; common fine prominent light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6) redoximorphic concentrations; strongly acid; gradual smooth boundary.

2C1—47 to 59 inches; dark gray (N 4/) silty clay; weak medium platy rock structure inherited from shale; firm; few fine roots; few white (10YR 8/1) (dry) sand grains on surfaces of plates; common fine prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; strongly acid; clear smooth boundary.

2C2—59 to 75 inches; light gray (5Y 7/1) silty clay; weak medium platy rock structure inherited from shale; firm; few fine roots; few white (10YR 8/1) (dry) sand grains on surfaces of plates; common medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; strongly acid; clear smooth boundary.

2Cr—75 to 80 inches; gray (5Y 6/1) silty clay laminated shale; massive with weak medium platy rock structure inherited from shale; very firm; common medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations; strongly acid.

Range in Characteristics

Depth to silty clay shale paralithic contact: 40 to 80 inches
Depth to carbonates: More than 80 inches

A horizon:
Hue—10YR
Value—3 or 4
Chroma—2
Texture—loam, silt loam, or silty clay loam
Content of rock fragments—0 to 10 percent
Reaction—moderately acid to neutral

E horizon:
Hue—10YR
Value—4 or 5
Chroma—2 or 3
Texture—silt loam or loam

Content of rock fragments—0 to 10 percent
Reaction—moderately acid or slightly acid

Bt horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 to 4
Texture—clay loam, silty clay loam, or silty clay
Content of rock fragments—0 to 10 percent
Reaction—moderately acid or slightly acid

2Bt horizon:
Hue—10YR to 5Y or N
Value—5 or 6
Chroma—0 to 4
Texture—silty clay loam, silty clay, or clay
Content of rock fragments—less than 15 percent (shale, limestone, sandstone, and lignite)
Reaction—extremely acid to slightly acid

2BC or 2C horizon:
Hue—10YR to 5Y or N
Value—3 to 7
Chroma—0 to 4
Texture—silty clay loam, silty clay, or clay
Content of rock fragments—less than 15 percent (shale, limestone, sandstone, and lignite)
Reaction—extremely acid to slightly acid

2Cr horizon:
Hue—10YR to 5Y or N
Value—3 to 6
Chroma—0 to 6
Texture—silty clay loam, silty clay, clay, fissile shale, or lignite
Content of rock fragments—less than 15 percent (shale, limestone, sandstone, and lignite)
Base saturation—low
Reaction—extremely acid to slightly acid

Nevin Series

Typical Pedon

Nevin silt loam, 0 to 2 percent slopes, rarely flooded, in a cultivated field on a stream terrace in Adams County, Iowa; about 380 feet west and 250 feet south of the northeast corner of sec. 31, T. 71 N., R. 35 W.; USGS Villisca (IA) topographic quadrangle; lat. 40 degrees 54 minutes 52.9 seconds N. and long. 94 degrees 54 minutes 45.7 seconds W.; NAD 83:

Ap—0 to 7 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; common very fine roots; common very fine tubular pores; slightly acid; abrupt smooth boundary.
A1—7 to 15 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; weak fine and medium granular structure; friable; common very fine roots; common very fine tubular pores; moderately acid; gradual smooth boundary.
A2—15 to 22 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine subangular blocky structure parting to weak fine granular; friable;

common very fine roots; common very fine tubular pores; moderately acid; clear smooth boundary.

BA—22 to 30 inches; dark grayish brown (2.5Y 4/2) silty clay loam; moderate very fine subangular blocky structure; friable; common very fine roots; common very fine tubular pores; many distinct very dark gray (10YR 3/1) organic stains on vertical faces of peds; moderately acid; gradual smooth boundary.

Btg1—30 to 37 inches; dark grayish brown (2.5Y 4/2) silty clay loam; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; common very fine tubular pores; common distinct dark grayish brown (10YR 4/2) clay films on vertical faces of peds; common distinct very dark grayish brown (10YR 3/2) organic stains on vertical faces of peds; common fine distinct light olive brown (2.5Y 5/4) redoximorphic concentrations on faces of peds; moderately acid; gradual smooth boundary.

Btg2—37 to 43 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common very fine tubular pores; common distinct dark grayish brown (10YR 4/2) clay films on vertical faces of peds; common fine distinct light olive brown (2.5Y 5/4) redoximorphic concentrations on faces of peds; moderately acid; gradual smooth boundary.

Btg3—43 to 53 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate coarse prismatic structure parting to weak medium subangular blocky; friable; common very fine tubular pores; few distinct dark grayish brown (10YR 4/2) clay films on vertical faces of peds; few distinct very dark grayish brown (10YR 3/2) organic stains on vertical faces of peds; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations on faces of peds; slightly acid; gradual smooth boundary.

BCg—53 to 63 inches; grayish brown (2.5Y 5/2) silty clay loam; weak coarse prismatic structure; friable; common very fine tubular pores; few distinct very dark grayish brown (10YR 3/2) organic stains on vertical faces of peds; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations on faces of peds; slightly acid; clear smooth boundary.

Cg—63 to 80 inches; grayish brown (2.5Y 5/2) silty clay loam; massive; friable; common very fine tubular pores; many fine and medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations on faces of peds; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 36 inches
Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

BA and Btg horizons:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—silty clay loam
Reaction—moderately acid to neutral

BCg horizon:
Hue—10YR or 2.5Y
Value—4 or 5

Chroma—1 to 4
Texture—silty clay loam
Reaction—slightly acid or neutral

Cg horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—1 to 4
Texture—silty clay loam or silt loam
Reaction—slightly acid or neutral

Nira Series

Typical Pedon

Nira silty clay loam, in an area of Sharpsburg-Nira complex, 9 to 14 percent slopes, moderately eroded, in a cultivated field in the uplands in Cass County, Iowa; about 2,195 feet west and 588 feet south of the northeast corner of sec. 19, T. 77 N., R. 34 W.; USGS Anita NE (IA) topographic quadrangle; lat. 41 degrees 27 minutes 33.2 seconds N. and long. 94 degrees 48 minutes 16 seconds W.; NAD 83:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure parting to weak fine granular; friable; common fine and very fine roots; common very fine pores; moderately acid; gradual smooth boundary.

Bt—7 to 12 inches; brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; friable; common fine and very fine roots; common very fine pores; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine distinct dark reddish brown (5YR 3/4) and dark yellowish brown (10YR 4/6) redoximorphic concentrations; common fine faint grayish brown (2.5Y 5/2) redoximorphic depletions; slightly acid; gradual smooth boundary.

Btg1—12 to 23 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate fine subangular blocky structure; friable; common very fine roots; common very fine pores; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

Btg2—23 to 31 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium subangular blocky structure; friable; common very fine roots; common very fine pores; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine prominent yellowish red (5YR 4/6) and many medium prominent dark yellowish brown (10YR 4/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

Btg3—31 to 36 inches; grayish brown (2.5Y 5/2) silty clay loam; weak fine prismatic structure parting to moderate fine subangular blocky; friable; common very fine roots; common very fine pores; few distinct dark grayish brown (10YR 4/2) clay films on surfaces along root channels; few fine prominent black (10YR 2/1) iron-manganese masses on surfaces along root channels; many medium prominent strong brown (7.5YR 4/6) redoximorphic concentrations; neutral; clear wavy boundary.

Bg—36 to 45 inches; grayish brown (2.5Y 5/2) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common very fine roots; common very fine pores; many fine prominent yellowish brown (10YR 5/6) and many medium prominent strong brown (7.5YR 4/6) redoximorphic concentrations; neutral; clear wavy boundary.

BCg—45 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; common very fine pores; few fine prominent black (10YR 2/1) iron-manganese masses on surfaces along root channels; common fine prominent yellowish red (5YR 4/6) redoximorphic concentrations; neutral; gradual smooth boundary.

Cg—60 to 80 inches; grayish brown (2.5Y 5/2) silty clay loam; massive; friable; common very fine pores; common fine prominent white (10YR 8/1) carbonate masses; common fine prominent yellowish red (5YR 4/6) redoximorphic concentrations; strongly effervescent; slightly alkaline.

Range in Characteristics

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam
Reaction—moderately acid to neutral

Bt or Bw horizon:
Hue—10YR
Value—3 or 4
Chroma—3 or 4
Texture—silty clay loam or silt loam
Reaction—strongly acid to neutral

Btg or Bg horizon:
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—silty clay loam or silt loam
Reaction—strongly acid to neutral

BCg and Cg horizons:
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—silty clay loam or silt loam
Reaction—moderately acid to neutral

Taxadjunct features: The moderately eroded and severely eroded Nira soils in Cass County do not have surface horizons that meet the criteria for a Mollisol. These soils are classified as fine-silty, mixed, superactive, mesic Aquic Hapludalfs.

Nodaway Series

Typical Pedon

Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain in Adams County, Iowa; about 2,270 feet west and 375 feet north of the southeast corner of sec. 17, T. 71 N., R. 35 W.; USGS Villisca (IA) topographic quadrangle; lat. 40 degrees 56 minutes 43.7 seconds N. and long. 94 degrees 53 minutes 53.9 seconds W.; NAD 83:

Ap—0 to 8 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; common fine roots; common very fine tubular pores; slightly acid; abrupt smooth boundary.

C1—8 to 32 inches; about 95 percent very dark brown (10YR 2/2) silt loam stratified with 5 percent grayish brown (10YR 5/2) silt loam; massive; friable; common very fine roots; many very fine tubular pores; slightly acid; gradual smooth boundary.

C2—32 to 80 inches; about 95 percent very dark grayish brown (10YR 3/2) silt loam stratified with 5 percent grayish brown (10YR 5/2) silt loam; massive; friable; common fine roots; few very fine tubular pores; neutral.

Range in Characteristics

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam
Reaction—slightly acid or neutral

C horizon:
Hue—10YR
Value—2 to 5
Chroma—1 or 2
Texture—silt loam or silty clay loam or stratified with these textures
Reaction—slightly acid or neutral

Olmitz Series

Typical Pedon

Olmitz loam, 2 to 5 percent slopes, in a cultivated field on an alluvial fan in Adams County, Iowa; about 1,640 feet east and 630 feet south of the northwest corner of sec. 30, T. 71 N., R. 35 W.; USGS Villisca (IA) topographic quadrangle; lat. 40 degrees 55 minutes 41 seconds N. and long. 94 degrees 55 minutes 16 seconds W.; NAD 83:

Ap—0 to 8 inches; black (10YR 2/1) loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; common fine roots; common fine tubular pores; moderately acid; abrupt smooth boundary.

A1—8 to 17 inches; black (10YR 2/1) clay loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure parting to moderate medium granular; friable; common fine roots; common very fine tubular pores; slightly acid; gradual smooth boundary.

A2—17 to 27 inches; very dark brown (10YR 2/2) clay loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; friable; common very fine roots; common very fine tubular pores; very many distinct black (10YR 2/1) organic stains on vertical faces of peds; neutral; gradual smooth boundary.

A3—27 to 34 inches; very dark grayish brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) dry; moderate fine prismatic structure parting to moderate fine subangular blocky; friable; many very fine roots; common very fine tubular pores; very many distinct very dark brown (10YR 2/2) organic stains on vertical faces of peds; neutral; gradual wavy boundary.

Bw1—34 to 42 inches; dark brown (10YR 3/3) clay loam, brown (10YR 5/3) dry; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; common very fine roots; common medium tubular pores; many distinct very dark brown (10YR 2/2) organic stains on vertical faces of peds; neutral; gradual smooth boundary.

Bw2—42 to 54 inches; brown (10YR 4/3) clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; common very fine roots; common very fine tubular pores; common distinct dark brown (10YR 3/3) organic stains on vertical faces of peds; neutral; gradual smooth boundary.

Bw3—54 to 67 inches; brown (10YR 4/3) clay loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; common very fine tubular pores; few distinct dark brown (10YR 3/3) organic stains on vertical faces of peds; neutral; gradual smooth boundary.

BC—67 to 80 inches; brown (10YR 4/3) clay loam; weak coarse prismatic structure; friable; common very fine tubular pores; common fine faint dark yellowish brown (10YR 4/4) redoximorphic concentrations on faces of peds; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 60 inches
Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam or clay loam
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture—clay loam
Reaction—strongly acid to neutral

BC horizon:
Hue—10YR
Value—4
Chroma—2 or 3
Texture—loam or clay loam
Reaction—strongly acid to neutral

Sharpsburg Series

Typical Pedon

Sharpsburg silty clay loam, 2 to 5 percent slopes, in a cultivated field in the uplands in Adams County, Iowa; about 885 feet west and 250 feet south of the northeast corner of sec. 36, T. 71 N., R. 34 W.; USGS Corning South (IA) topographic quadrangle; lat. 40 degrees 54 minutes 48 seconds N. and long. 94 degrees 42 minutes 11 seconds W.; NAD 83:

Ap—0 to 7 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure parting to weak fine granular; friable; common fine roots; common very fine tubular pores; strongly acid; abrupt smooth boundary.

A1—7 to 14 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate very fine subangular blocky structure parting to moderate fine granular; friable; common very fine roots; common very fine tubular pores; moderately acid; clear smooth boundary.

A2—14 to 20 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate very fine subangular blocky structure; friable; common fine roots; common very fine tubular pores; very many distinct very dark brown (10YR 2/2) organic stains on vertical faces of peds; moderately acid; clear wavy boundary.

Bt1—20 to 25 inches; brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; firm; common very fine roots; common very fine tubular pores; common distinct dark brown (10YR 3/3) clay films on vertical faces of peds;

common distinct very dark grayish brown (10YR 3/2) organic stains on vertical faces of peds; moderately acid; gradual smooth boundary.

Bt2—25 to 31 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine prismatic structure parting to moderate very fine and fine subangular blocky; firm; common very fine roots; common very fine tubular pores; many distinct brown (10YR 4/3) clay films on vertical faces of peds; few distinct very dark grayish brown (10YR 3/2) organic stains on vertical faces of peds; few fine distinct light brownish gray (2.5Y 6/2) redoximorphic depletions; moderately acid; clear smooth boundary.

Bt3—31 to 38 inches; brown (10YR 5/3) silty clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; common very fine roots; common very fine tubular pores; many distinct dark yellowish brown (10YR 4/4) clay films on vertical faces of peds; common fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; common fine faint light brownish gray (2.5Y 6/2) redoximorphic depletions on faces of peds; moderately acid; gradual smooth boundary.

Bt4—38 to 48 inches; light olive brown (2.5Y 5/3) silty clay loam; moderate medium prismatic structure parting to weak medium subangular blocky; friable; common very fine roots; common very fine tubular pores; few distinct dark yellowish brown (10YR 4/4) clay films on vertical faces of peds; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; common fine faint light brownish gray (2.5Y 6/2) redoximorphic depletions; moderately acid; gradual smooth boundary.

Btg—48 to 57 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium prismatic structure parting to weak medium and coarse subangular blocky; friable; common very fine roots; common very fine tubular pores; few distinct dark yellowish brown (10YR 4/4) clay films on vertical faces of peds; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

BCg—57 to 65 inches; grayish brown (2.5Y 5/2) silty clay loam; weak coarse prismatic structure; friable; many very fine tubular pores; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

Cg—65 to 80 inches; grayish brown (2.5Y 5/2) silt loam; massive; friable; many very fine tubular pores; many fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—silty clay loam
Reaction—strongly acid to slightly acid

Bt horizon (upper part):
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silty clay or silty clay loam
Reaction—strongly acid to slightly acid

Bt horizon (lower part):
Hue—7.5YR to 5Y
Value—4 to 6
Chroma—2 to 6
Texture—silty clay loam
Reaction—moderately acid or slightly acid

BC or C horizon:
Hue—7.5YR to 5Y
Value—4 to 6
Chroma—2 to 6
Texture—silty clay loam
Reaction—moderately acid to neutral

Taxadjunct features: The moderately eroded and severely eroded Sharpsburg soils in Cass County, including those on terraces, do not have surface horizons that meet the criteria for a Mollisol. The moderately eroded soils are classified as fine, smectitic, mesic Mollic Hapludalfs. The severely eroded soils are classified as fine, smectitic, mesic Typic Hapludalfs.

Shelby Series

Typical Pedon

Shelby clay loam (fig. 12), in an area of Lamoni-Shelby complex, 9 to 14 percent slopes, moderately eroded, in a cultivated field in the uplands in Adams County, Iowa; about 1,900 feet west and 2,460 feet north of the southeast corner of sec. 33, T. 72 N., R. 32 W.; USGS Lenox (IA) topographic quadrangle; lat. 40 degrees 59 minutes 33 seconds N. and long. 94 degrees 32 minutes 06 seconds W.; NAD 83:

Ap—0 to 7 inches; about 80 percent very dark grayish brown (10YR 3/2) and 20 percent brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) dry; weak very fine subangular blocky structure; friable; common fine roots; common very fine pores; very many distinct very dark gray (10YR 3/1) organic stains on faces of peds; neutral; abrupt smooth boundary.

Bt1—7 to 15 inches; about 85 percent brown (10YR 5/3) and 15 percent yellowish brown (10YR 5/4) clay loam; moderate fine subangular blocky structure; firm; common fine roots; common fine pores; many distinct brown (10YR 4/3) clay films on vertical faces of peds; about 2 percent subrounded gravel; slightly acid; clear smooth boundary.

Bt2—15 to 23 inches; yellowish brown (10YR 5/4) clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common fine pores; common distinct dark yellowish brown (10YR 4/4) clay films on vertical faces of peds; common fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; common fine distinct grayish brown (2.5Y 5/2) redoximorphic depletions; about 2 percent subrounded gravel; slightly acid; gradual smooth boundary.

Bt3—23 to 31 inches; yellowish brown (10YR 5/4) clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common very fine roots; common very fine pores; common distinct dark yellowish brown (10YR 4/4) clay films on vertical faces of peds; few fine distinct very dark brown (10YR 2/2) iron-manganese masses; common medium distinct yellowish brown (10YR 5/6) redoximorphic concentrations; common fine distinct grayish brown (2.5Y 5/2) redoximorphic depletions; about 1 percent subrounded gravel; neutral; clear wavy boundary.

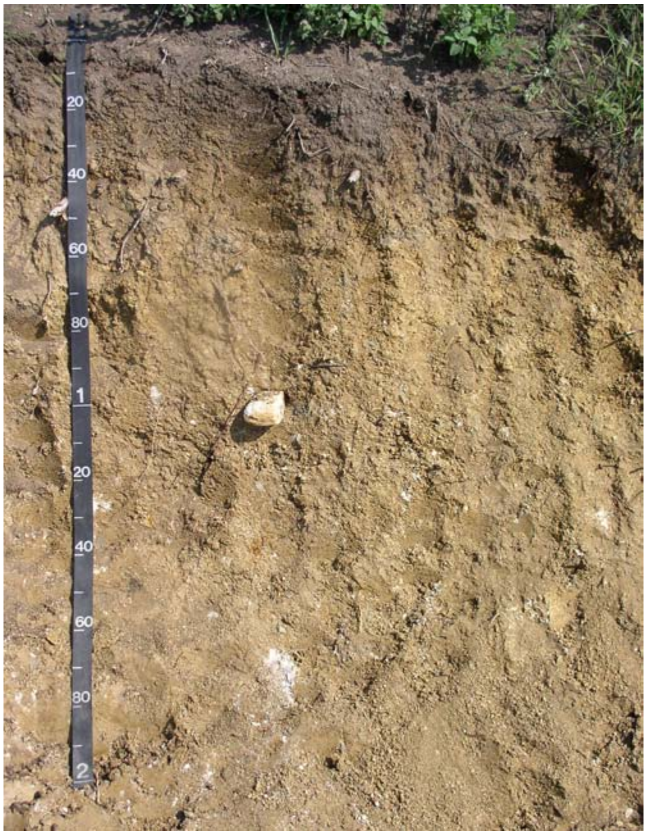

Figure 12.—Profile of a Shelby soil. Depth is marked in centimeters.

Bk1—31 to 40 inches; yellowish brown (10YR 5/4) clay loam; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; common very fine pores; common fine distinct weakly cemented very dark brown (10YR 2/2) iron-manganese masses; few medium prominent spherical white (10YR 8/1) carbonate concretions; common fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; common medium distinct grayish brown (2.5Y 5/2) redoximorphic depletions; about 3 percent subrounded gravel; moderately alkaline; gradual smooth boundary.

Bk2—40 to 48 inches; yellowish brown (10YR 5/4) clay loam; weak coarse prismatic structure; firm; common very fine pores; common fine distinct very dark brown (10YR 2/2) iron-manganese masses; few fine prominent white (10YR 8/1) carbonate masses; common medium distinct yellowish brown (10YR 5/6) redoximorphic concentrations; common medium distinct grayish brown (2.5Y 5/2) redoximorphic depletions; about 4 percent rounded gravel; moderately alkaline; clear smooth boundary.

C1—48 to 55 inches; yellowish brown (10YR 5/4) clay loam; massive; firm; common very fine pores; common fine distinct very dark brown (10YR 2/2) iron-manganese masses; few fine prominent white (10YR 8/1) carbonate masses; common medium and coarse distinct grayish brown (2.5Y 5/2) redoximorphic depletions; about 4 percent subrounded gravel; slightly alkaline; clear smooth boundary.

C2—55 to 80 inches; yellowish brown (10YR 5/4) clay loam; massive; firm; common very fine pores; common fine distinct very dark brown (10YR 2/2) iron-manganese masses; very few fine prominent white (10YR 8/1) carbonate masses; common fine distinct grayish brown (2.5Y 5/2) redoximorphic depletions; about 4 percent subrounded gravel; slightly alkaline.

Range in Characteristics

Depth to carbonates: More than 30 inches

Ap or A horizon:
Hue—10YR
Value—2 to 5
Chroma—1 to 3
Texture—clay loam or loam
Reaction—strongly acid to neutral

Bt horizon:
Hue—10YR
Value—3 to 5
Chroma—3 to 6
Texture—clay loam
Reaction—strongly acid to neutral

Bk horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 6
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

C horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture—clay loam or loam
Reaction—neutral to moderately alkaline

Taxadjunct features: The moderately eroded and severely eroded Shelby soils in Cass County do not have surface horizons that meet the criteria for a Mollisol. The moderately eroded Shelby soils are classified as fine-loamy, mixed, superactive, mesic Mollic Hapludalfs. The severely eroded Shelby soils are classified as fine-loamy, mixed, superactive, mesic Typic Hapludalfs.

Vesser Series

Typical Pedon

Vesser silt loam, on a nearly level flood plain in a cultivated field in Wayne County, Iowa; about 1,043 feet west and 1,745 feet north of the southeast corner of sec. 5, T. 69 N., R. 21 W.; USGS Corydon (IA) topographic quadrangle; lat. 40 degrees 48 minutes 07 seconds N. and long. 93 degrees 17 minutes 32 seconds W.; NAD 83:

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; many fine roots; common distinct black (10YR 2/1) organic coatings on all faces of peds; slightly acid; clear smooth boundary.

A—8 to 15 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; many fine roots; common distinct black (10YR 2/1) organic coatings on all faces of peds; few fine distinct brown (7.5YR 4/3) redoximorphic concentrations; moderately acid; clear smooth boundary.

E1—15 to 23 inches; dark gray (10YR 4/1) silt loam, gray (10YR 6/1) dry; weak thick platy structure parting to weak fine subangular blocky; friable; many fine roots; many distinct very dark gray (10YR 3/1) organic coatings on all faces of peds;

few fine distinct brown (7.5YR 4/3) redoximorphic concentrations; strongly acid; gradual smooth boundary.

E2—23 to 31 inches; dark gray (10YR 4/1) silt loam, gray (10YR 6/1) dry; weak thick platy structure parting to moderate fine subangular blocky; friable; common fine roots; many distinct very dark gray (10YR 3/1) organic coatings on all faces of peds; few distinct light gray (10YR 7/2) (dry) silt coatings on all faces of peds; common fine distinct brown (7.5YR 4/3) redoximorphic concentrations; strongly acid; clear smooth boundary.

Btg1—31 to 37 inches; dark gray (10YR 4/1) silty clay loam; moderate fine subangular blocky structure; friable; common fine roots; common distinct black (10YR 2/1) clay films on all faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on all faces of peds; few distinct light gray (10YR 7/2) (dry) silt coatings on all faces of peds; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; strongly acid; gradual smooth boundary.

Btg2—37 to 47 inches; dark gray (10YR 4/1) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; many distinct black (10YR 2/1) clay films on all faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on all faces of peds; few distinct light gray (10YR 7/2) (dry) silt coatings on all faces of peds; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Btg3—47 to 57 inches; dark gray (10YR 4/1) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common distinct black (10YR 2/1) clay films on all faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on all faces of peds; few distinct light gray (10YR 7/2) (dry) silt coatings on all faces of peds; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Btg4—57 to 66 inches; dark gray (10YR 4/1) silty clay loam; weak medium prismatic structure parting to weak fine subangular blocky; friable; few very fine roots; common distinct black (10YR 2/1) clay films on all faces of peds; few prominent very pale brown (10YR 8/2) (dry) sand grains on vertical faces of peds; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

BCg—66 to 77 inches; dark grayish brown (2.5Y 4/2) silty clay loam; moderate medium prismatic structure; firm; few prominent very pale brown (10YR 8/2) (dry) sand grains; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Cg—77 to 80 inches; dark grayish brown (2.5Y 4/2) silty clay loam; massive; firm; few prominent very pale brown (10YR 8/2) (dry) sand grains; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; strongly acid.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: More than 80 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—strongly acid to slightly acid

E horizon:
Hue—10YR
Value—3 to 5

Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—very strongly acid to moderately acid

Btg horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—1 or 2
Texture—silty clay loam
Reaction—strongly acid or moderately acid

BCg horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—1 or 2
Texture—silty clay loam or silt loam
Reaction—strongly acid or moderately acid

Wabash Series

Typical Pedon

Wabash silty clay loam, occasionally ponded, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain in Adams County, Iowa; about 90 feet east and 160 feet north of the southwest corner of sec. 32, T. 71 N., R. 35 W.; USGS Villisca (IA) topographic quadrangle; lat. 40 degrees 54 minutes 04 seconds N. and long. 94 degrees 54 minutes 36 seconds W.; NAD 83:

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure; firm; common very fine roots; common very fine tubular pores; neutral; abrupt smooth boundary.

A1—7 to 15 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; firm; common medium roots; common fine tubular pores; slightly acid; clear smooth boundary.

A2—15 to 27 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; moderate fine prismatic structure parting to moderate fine subangular blocky; very firm; common fine roots; common very fine tubular pores; moderately acid; gradual smooth boundary.

A3—27 to 36 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; strong medium prismatic structure parting to strong fine subangular blocky; very firm; common very fine tubular pores; common fine distinct dark grayish brown (2.5Y 4/2) redoximorphic depletions; moderately acid; gradual smooth boundary.

Bg1—36 to 45 inches; very dark gray (10YR 3/1) silty clay; strong medium prismatic structure parting to strong fine and medium subangular blocky; very firm; common very fine tubular pores; common fine faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; moderately acid; gradual smooth boundary.

Bg2—45 to 54 inches; very dark gray (10YR 3/1) silty clay; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm; common fine tubular pores; common fine faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; slightly acid; gradual smooth boundary.

Bg3—54 to 65 inches; very dark gray (10YR 3/1) silty clay; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common very fine tubular pores; common fine faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; slightly acid; clear smooth boundary.

BCg—65 to 80 inches; dark gray (10YR 4/1) silty clay; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; common very fine tubular pores;

common fine prominent yellowish brown (10YR 5/6) masses of oxidized iron; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 36 to 45 inches
Depth to carbonates: More than 40 inches

Ap or A horizon:
Hue—10YR to 5Y or N
Value—2 or 3
Chroma—0 to 2
Texture—silty clay loam or silty clay
Reaction—strongly acid to neutral

Bg horizon:
Hue—10YR to 5Y or N
Value—2 to 5
Chroma—0 to 2
Texture—silty clay or clay
Reaction—strongly acid to neutral

BCg horizon and Cg horizon (where present):
Hue—10YR to 5Y or N
Value—2 to 5
Chroma—0 to 2
Texture—silty clay or clay
Reaction—strongly acid to slightly alkaline

Wiota Series

Typical Pedon

Wiota silty clay loam, 0 to 2 percent slopes, rarely flooded, in a cultivated field on a stream terrace in Adams County, Iowa; about 2,145 feet east and 200 feet south of the northwest corner of sec. 27, T. 73 N., R. 34 W.; USGS Corning North (IA) topographic quadrangle; lat. 41 degrees 06 minutes 02 seconds N. and long. 94 degrees 44 minutes 55 seconds W.; NAD 83:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; many fine roots; common fine tubular pores; strongly acid; abrupt smooth boundary.

A1—8 to 15 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine and fine granular structure; friable; common very fine roots; many very fine tubular pores; strongly acid; gradual smooth boundary.

A2—15 to 22 inches; very dark grayish brown (10YR 3/2) silty clay loam, gray (10YR 5/1) dry; moderate very fine subangular blocky structure; friable; common very fine roots; many very fine tubular pores; very many distinct very dark gray (10YR 3/1) organic stains on vertical faces of peds; moderately acid; gradual smooth boundary.

AB—22 to 28 inches; about 80 percent very dark grayish brown (10YR 3/2) and 20 percent dark brown (10YR 3/3) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; common very fine roots; common very fine tubular pores; common distinct very dark gray (10YR 3/1) organic stains on vertical faces of peds; moderately acid; gradual smooth boundary.

Bt1—28 to 38 inches; brown (10YR 4/3) silty clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; common very fine roots; common very fine tubular pores; common distinct dark brown (10YR 3/3) clay films on vertical faces of peds; moderately acid; gradual smooth boundary.

Bt2—38 to 48 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; common very fine roots; common very fine tubular pores; common distinct brown (10YR 4/3) clay films on vertical faces of peds; moderately acid; gradual smooth boundary.

Bt3—48 to 59 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate coarse prismatic structure parting to moderate coarse subangular blocky; friable; common fine roots; common very fine tubular pores; common distinct brown (10YR 4/3) clay films on vertical faces of peds; common fine distinct grayish brown (10YR 5/2) redoximorphic depletions; moderately acid; gradual smooth boundary.

BC—59 to 70 inches; yellowish brown (10YR 5/4) silt loam; weak coarse prismatic structure; friable; common very fine tubular pores; common fine distinct grayish brown (10YR 5/2) redoximorphic depletions; moderately acid; clear smooth boundary.

C—70 to 80 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; common very fine tubular pores; many medium distinct grayish brown (2.5Y 5/2) redoximorphic depletions; moderately acid.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 32 inches
Depth to carbonates: More than 80 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—strongly acid to neutral

Bt horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam
Reaction—strongly acid to slightly acid

BC or C horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—1 to 6
Texture—silt loam or silty clay loam
Reaction—moderately acid or slightly acid

2C horizon (where present):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—1 to 6
Texture—sandy loam, loamy sand, fine sand, or sand or the gravelly analogs of these textures
Reaction—slightly acid or neutral

Zook Series

Typical Pedon

Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain in Cass County, Iowa; about 1,800 feet east and 210 feet north of the southwest corner of sec. 17, T. 76 N., R. 37 W.; USGS Walnut (IA) topographic quadrangle; lat. 41 degrees 24 minutes 17 seconds N. and long. 95 degrees 07 minutes 52 seconds W.; NAD 83:

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; slightly acid; abrupt smooth boundary.

A1—7 to 14 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; slightly acid; gradual smooth boundary.

A2—14 to 20 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; neutral; gradual smooth boundary.

A3—20 to 31 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; neutral; gradual smooth boundary.

A4—31 to 36 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common fine distinct olive gray (5Y 4/2) redoximorphic depletions; neutral; gradual smooth boundary.

Bg—36 to 52 inches; dark gray (5Y 4/1) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; neutral; gradual smooth boundary.

BCg—52 to 61 inches; about 70 percent dark gray (5Y 4/1) and 30 percent gray (5Y 5/1) silty clay loam; moderate coarse prismatic structure; firm; common fine faint grayish brown (2.5Y 5/2) redoximorphic depletions; neutral; clear smooth boundary.

Cg—61 to 80 inches; olive gray (5Y 5/2) silty clay loam; massive; friable; common fine prominent very dark brown (10YR 2/2) manganese masses; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 36 to more than 60 inches
Depth to carbonates: 60 to more than 80 inches

Ap or A horizon:
Hue—10YR or N; 10YR in overwash phase
Value—2 or 3
Chroma—0 or 1; 1 or 2 in overwash phase
Texture—silty clay loam or silty clay; silt loam in overwash phase
Reaction—moderately acid to slightly alkaline

Bg horizon:
Hue—10YR to 5Y
Value—2 to 5
Chroma—1
Texture—silty clay loam or silty clay
Reaction—slightly acid or neutral

BCg or Cg horizon:
Hue—10YR to 5Y
Value—2 to 5
Chroma—1 or 2
Texture—silty clay loam, silty clay, or silt loam
Reaction—slightly acid or neutral

Formation of the Soils

This section relates the soils in the survey area to the major factors of soil formation and describes the processes of horizon development.

Factors of Soil Formation

Soil forms through processes that act on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or topography; and the length of time that the forces of soil formation have acted on the soil material (Jenny, 1941). Human activities also affect soil formation.

Climate and plant and animal life, chiefly plants, are the active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material affects the kind of profile that forms and in extreme cases determines it almost entirely. Finally, time is needed for the transformation of parent material into a soil. Some time is always required for horizon differentiation. A long period generally is required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the others.

Climate

Cass County has a continental subhumid climate and has a wide range in temperature. The soils in the county are thought to have developed for the last 5,000 years under the kind of climate that exists today. The climate from about 5,000 to 16,000 years ago, however, is thought to have been cooler and more moist (Ruhe and Scholtes, 1956).

Nearly uniform climate prevails throughout Cass County. Major differences between the soils in the county were not caused by differences in the recent climate. Soils that formed in arid and semiarid climates normally have horizons that are less developed than the soils in Cass County. In warm, humid areas, such as the southeastern part of the United States, the soils are more highly leached and more strongly developed than the soils in Cass County.

Living Organisms

Vegetation has greatly influenced the development of soils in Cass County. Microorganisms also have had an important influence because they promote the decay of organic material. The native vegetation at the time the survey area was settled was mainly big bluestem and little bluestem, but a few areas along the major streams supported trees. It is believed that the environment in Iowa over the last 5,000 years was conducive to prairie vegetation (Ruhe and Scholtes, 1956). From 5,000 to 16,000 years ago, however, the cooler, wetter climate was more favorable to forest vegetation. The effect of this earlier period of forest vegetation is not reflected in the morphology of Marshall soils and other dark soils that formed more recently under prairie vegetation.

Marshall and Sharpsburg soils are typical of soils that formed under prairie vegetation in Cass County. The prairie grasses have thick, fibrous roots that penetrate the soil to a depth of 12 to 24 inches. As a result of this vegetation, Marshall soils have developed a thick, dark A horizon that has a relatively high content of organic matter.

Topography

Topography is an important factor in soil formation because of its effect on drainage, runoff, depth to the water table, and erosion. Slope ranges from nearly level to very steep in Cass County. A difference in relief is the main reason for the differing properties among some of the soils in the county.

Slope affects the thickness and color of the A horizon and the thickness of the solum through its effect on erosion and the amount of water that runs off and percolates through the soil. For example, the thickness and color of the A horizon in Marshall and Minden soils, which formed in similar parent material, are related to slope. The thickness of the A horizon increases and the color darkens as the slope decreases. Marshall soils are gently sloping to strongly sloping, and Minden soils are very gently sloping. Generally, Shelby soils are moderately sloping to steep. The solum of the Shelby soils is thinner than that of the Marshall and Minden soils and has carbonates closer to the surface.

Relief affects the color of the B horizon through its effect on drainage and soil aeration. In well drained soils the iron in the subsoil generally is brown because iron compounds are well distributed and are oxidized. In poorly drained soils, however, the subsoil is generally grayish and mottled. Bremer soils, which are on level or nearly level stream terraces, are examples of poorly drained soils. The moderately well drained, gently sloping to strongly sloping Marshall soils have a brownish B horizon. Minden soils have a grayish brown subsoil, which is characteristic of somewhat poorly drained soils.

Water that percolates through the upper part of the profile removes clay from the A horizon, and this clay accumulates in the B horizon. Generally, more water percolates through nearly level or depressional soils than through the soils in the more sloping areas, where some of the water runs off the surface. As a result, the content of clay in the B horizon generally is higher in the soils in nearly level areas.

Parent Material

Most of the soils in Cass County formed in materials transported to the site by wind, water, or glacial ice. These materials include loess and eolian sand, alluvium, and glacial till. A few soils formed as a result of exposure of the underlying bedrock, mainly shale.

The survey area underwent at least seven major episodes (stages) of glaciation during the Pleistocene Epoch. These stages are represented by separate till layers (Boellstorff, 1978) resting on Pennsylvanian and Cretaceous bedrock. These tills are collectively referred to as Pre-Illinoisan because they predate the Illinoisan Glacial Stage. The youngest of the Pre-Illinoisan tills is at least 500,000 years old, and the oldest is more than 2.2 million years old (Boellstorff, 1978). The glacial landscape underwent erosion, dissection, and soil formation throughout the Yarmouth Interglacial Stage, the Illinoisan Glacial Stage, and the Sangamon Interglacial Stage. During the last ice age, called the Wisconsin Glacial Stage, the landscape was blanketed by windblown loess—silty deposits belonging mainly to the Peoria Formation—and less extensive deposits of eolian, or windblown, sand. (Glacial ice did not cover Cass

County during either the Illinoisan or the Wisconsinan Stage.) During the Holocene Epoch, the landscape has become further dissected and beveled and loess-derived alluvium of the DeForest Formation has been deposited in the valleys (Bettis and others, 2002).

Loess is the most extensive parent material in the county. The loess ranges in thickness from about 12 to 24 feet on the more stable summits to a thin mantle of 4 to 12 feet on the side slopes. Unweathered loess is silt loam or silty clay loam and consists of accumulated particles of silt and lesser amounts of clay deposited by the wind. The mineral composition is heterogeneous (Kay and Graham, 1943), and mineral plant nutrients are abundant. It is assumed that the loess was calcareous when it was deposited. Exira, Marshall, Minden, Nira, and Sharpsburg soils formed in loess. These soils can be distinguished from many other soils by the absence of pebbles and sand-sized particles in the soil profile. They can be distinguished from one another by comparing characteristics that are the result of soil-forming factors other than parent material. The characteristics of the Sharpsburg soils in southwestern Iowa have been studied in detail (Hutton, 1947, 1951; Ulrich, 1950, 1951) and are described in the earlier soil survey of Cass County (Jury and others, 1969).

Loess-covered stream terraces are adjacent to large watercourses, such as the East Nishnabotna River and Turkey Creek, throughout Cass County. Generally, the thickness of the loess on these stream terraces is 12 to 20 feet. The content of sand in the loess in these areas is somewhat higher than in the loess on uplands; the normal range of sand content is 4 to 8 percent.

Below the loess is older alluvial material. This older alluvium is quite variable in color and texture. It was deposited during a period when the flood plain was at a much higher elevation than it is now. The buried alluvium ranges from black silty clay to brown and strong brown loamy sand. Resumed downcutting of the stream channel resulted in destruction of the previous flood plain, and remnants of the older alluvium remained at the higher elevations. These remnants of older alluvium were later buried by Wisconsin-age loess. Elevation of the loess-covered stream terraces ranges from 1,105 feet to 1,210 feet.

Glacial till is another extensive parent material in Cass County. The tills are primarily subglacial in origin and consist of unsorted deposits ranging in size from boulders to clay that were deposited beneath an ice sheet. The till layers also commonly contain water-sorted glacial sediments in the form of sand or silt layers and inclusions, which were deposited on top of, within, or beneath an ice sheet. The various till layers have many properties in common. In the unweathered state the till material is a firm, calcareous clay loam and contains boulders, cobbles, pebbles, sand, silt, and clay. It is a heterogeneous mixture that shows little evidence of sorting or stratification. The mineral composition of the till also is very heterogeneous (Boellstorff, 1978) and includes a wide variety of rock and mineral types plucked from geologic materials overridden by the glaciers as they advanced from the north and northwest.

The soil that formed in till on level topographic divides prior to the deposition of loess, called the Yarmouth-Sangamon paleosol, is strongly weathered due to long exposure on the landscape. (A paleosol is a soil that formed on a landscape in the past under soil-forming conditions that no longer exist.) Very few primary minerals other than quartz remain in this soil, as they have been lost to weathering. The subsoil is a gray clay often called gumbotil (Kay and Graham, 1943; Wood, 1941). The thickness of the gumbotil ranges from 4 to 8 feet in Cass County.

Soils that formed on the sloping parts of the Pre-Illinoisan till plain during the Sangamon Interglacial Stage, called Sangamon paleosols, are less weathered and less well developed than the Yarmouth-Sangamon paleosol. They are brownish gray or reddish. Most of these paleosols contain a layer of pebbles, or a stone line (Ruhe, 1959), in the upper part of the solum. This layer is a lag of coarse rock fragments remaining after the erosion or truncation of the surface horizons left only the lower part of the paleosol.

Deposition of several feet of loess during the Wisconsin Stage terminated soil formation on the till surface. In some cases the buried soils were resaturated by bases leaching downward from the overlying loess. Since the Wisconsin time, most or all of the loess has been eroded away on many side slopes and the old paleosols have been reexposed, or “exhumed.” Clarinda soils occur in sloping areas where the Yarmouth-Sangamon paleosol has been exposed. Adair and Lamoni soils formed in exhumed Sangamon paleosols. They typically occur downslope from Clarinda soils, in bands at the shoulders of side slopes.

In many places, geologic erosion of the land surface was deep enough to remove the entire Yarmouth-Sangamon paleosol profile as well as the younger loess cover. In these places, slightly weathered till is exposed at the surface and is the parent material for Shelby soils.

Alluvium is the third most extensive parent material in Cass County. The texture of the alluvium normally ranges from silt loam to silty clay. Some of the alluvial material was transported only short distances and is called local alluvium. It retains many characteristics of the soils in the area from which it was eroded. Judson soils, for example, which generally occur at the foot of slopes directly below loess-derived soils, have less sand and more silt in the solum than the loess-derived soils. Olmitz soils are downslope from till-derived soils and contain correspondingly more sand in the solum. Kennebec, Nodaway, and Zook soils formed in alluvium consisting of local sediments that washed from nearby uplands and intermixed with sediments that washed from longer distances. Bremer, Nevin, and Wiota soils are above the level of the present flood plain and presumably formed in older alluvium than that in which the Kennebec and Zook soils formed. Nodaway soils formed in deposited alluvium.

Eolian sand also occurs in Cass County. It consists largely of quartz sand, which is very resistant to weathering. Soils that formed in eolian sand, such as the Dickinson soils that have a loamy substratum, exhibit minimal soil development. These soils can be distinguished from other soils by their high sand content and low clay content.

Scattered deposits of eolian sand occur below the surface of the loess on the leeward side of the East Nishnabotna River and Troublesome Creek in positions on terraces and uplands. The thickness of the eolian sand ranges from 6 inches to as much as 4 feet. The sand has been buried by loess approximately 10 feet thick. The eolian sand ranges east into the uplands from the flood plain approximately 1 mile. The main extent of the eolian sand is from Grove Township north into Audubon County.

A few exposures of shale occur in the survey area, mainly in the western half of the county. Weathered shale can be distinguished from loess by its high clay content and by its slippery feel when moist. Unlike glacial till, weathered shale does not contain coarse sand and gravel. The Cretaceous shale in Cass County is acidic, whereas the older Pennsylvanian shales contain numerous shells from aquatic invertebrates, which give the bedrock a high content of calcium carbonate.

Time

Time is required for the various processes of soil formation to affect the parent material. The amount of time necessary ranges from a few days for the formation of fresh alluvial deposits, such as those that make up Nodaway soils, to more than a thousand years for many of the older upland soils. Older or more strongly developed soils have well defined genetic horizons and have a higher content of clay in the subsoil than younger soils that formed in similar kinds of parent material. As a soil forms, clay is moved from the surface layer to the subsoil. This transfer increases the content of clay in the subsoil. The increased content of clay in the subsoil is more evident in a nearly level soil than in a more sloping soil. Sharpsburg soils are examples of soils in which this process has taken place. Less well developed soils, such as

Marshall soils, have only weakly developed horizons. Some of the soils that formed in alluvium have little or no profile development because fresh material is deposited periodically.

If other factors are favorable, the texture of the subsoil generally becomes finer and a greater amount of soluble materials is leached out as the soils continue to weather. In soils in the steeper areas, material is generally removed before there has been time for the development of a deep profile that has strong horizons. Even where the material has been in place a long time, the soil exhibits little development because much of the water runs off the surface instead of through the soil material. Shelby soils formed on recently dissected slopes of Late Wisconsin age.

In places where organic materials, such as trees, have been buried by later deposition through the action of ice, water, or wind, the age of the landscape can be determined by the process known as radiocarbon dating. In Cass County, the loess (called Peorian Loess) in which Marshall and Sharpsburg soils formed is about 12,500 to 25,000 years old (U.S. Geological Survey, 1996). Time is needed for soil development, but the age of the parent material does not necessarily reflect the true age of the soil profile.

Processes of Horizon Development

Horizon differentiation is the result of four basic processes. These are additions, removals, transfers, and transformations (Simonson, 1959). Each of these affects many substances in the soils, such as organic matter, soluble salts, carbonates, sesquioxides, and silicate clay minerals. The changes brought about by these processes help to determine the ultimate nature of the soil profile.

The accumulation of organic matter is an early phase in the formation of most soils. The content of organic matter ranges from high to very low in the A horizon of the soils in Cass County. It is low to moderate in the thinner A horizon of the Shelby soils and high in the thick A horizon of the Bremer and Zook soils.

The removal and transfer of chemical compounds within the soil profile are important aspects in horizon development of the soils in Cass County. Free carbonates and bases have been leached downward from horizons above. Some soils are so strongly leached that they are strongly acid in the subsoil. Phosphorus is removed from the subsoil by plant roots and transferred to the parts of the plant growing above the ground. It is then returned to the surface layer in the plant residue. This process affects the forms and distribution of the phosphorus in the profile.

The translocation of silicate clay minerals has an important effect on horizon development. The clay minerals are carried downward in suspension by percolating water from the A horizon. They accumulate in the B horizon as fillings in pores and root channels and as clay films on the faces of peds. This process has affected many of the soils in the county. In other soils, the clay content of the A horizon is not markedly different from that of the B horizon and other evidence of clay movement is minimal.

Shrinking and swelling can result in another kind of transfer. This process has a minimal effect in most soils but occurs to a greater extent in very clayey soils. Shrinking that occurs as the soil dries causes cracks to form. The cracks can result in the incorporation of soil materials from the surface layer into the lower parts of the soil profile.

Transformations are physical and chemical. For example, in a common physical transformation, soil particles are weathered to smaller sizes. The reduction of iron is an example of a chemical transformation. This process, which is called gleying, involves the saturation of the soil with water for long periods in the presence of organic matter. It is characterized by the presence of ferrous iron and gray colors. Gleying is associated with poorly drained soils, such as Zook soils. The content of reductive extractable iron, or free iron, is normally lower in somewhat poorly drained soils, such as Nevin soils, than in the more well drained soils.

The weathering of the primary mineral apatite present in parent material to secondary phosphorus compounds is another kind of transformation. At a pH level near 7, for example, the primary mineral apatite is weathered to secondary phosphorus compounds. Thus, soils that have a pH near 7, such as Marshall soils, have more available phosphorus than calcareous soils that have a pH of more than 7.3.

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Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the "National Soil Survey Handbook" (available in local offices of the Natural Resources Conservation Service or on the Internet).

Ablation till. Loose, relatively permeable earthy material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Alpha,alpha-dipyridyl. A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of redoximorphic features.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction toward which a slope faces. Also called slope aspect.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope (fig. 13). In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Basal till. Compact till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

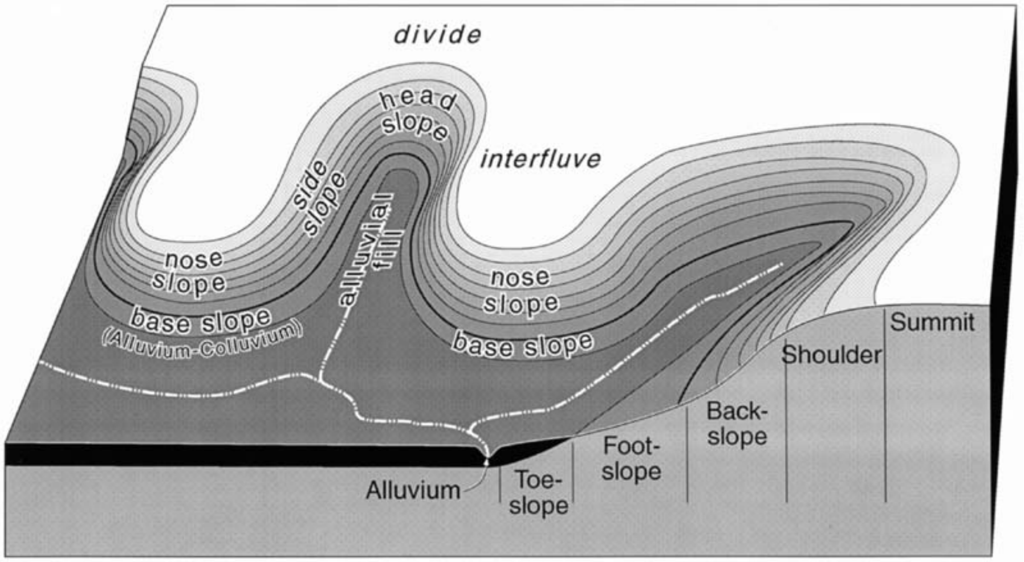

Figure 13.—Landscape relationship of geomorphic components and hillslope positions (modified after Ruhe and Walker, 1968).

Base slope (geomorphology). A geomorphic component of hills (fig. 13) consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Beach deposits. Material, such as sand and gravel, that is generally laid down parallel to an active or relict shoreline of a post-glacial or glacial lake.

Bedding plane. A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology) from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A saucer-, cup-, or trough-shaped depression formed by wind erosion on a preexisting dune or other sand deposit, especially in an area of shifting sand or loose soil or where protective vegetation is disturbed or destroyed; the adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Blowouts are commonly small.

Bottom land. An informal term loosely applied to various portions of a flood plain.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. See Terracettes.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. See Redoximorphic features.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A dense, compact, slowly permeable subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. A claypan is commonly hard when dry and plastic and sticky when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Colluvium. Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. See Redoximorphic features.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

Corrosion (geomorphology). A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations). Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delta. A body of alluvium having a surface that is fan shaped and nearly flat; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divide. (a) The line of separation, or (b) the summit area, or narrow tract of higher ground that constitutes the watershed boundary between two adjacent drainage basins (fig. 13); it divides the surface waters that flow naturally in one direction from those that flow in the opposite direction.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Drift. A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact till that has a core of bedrock or drift. It commonly has a blunt nose facing the direction from which the ice approached and a gentler slope tapering in the other direction. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Earthy fill. See Mine spoil.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian deposit. Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge of stratified sand and gravel deposited as the bed of a stream flowing in an ice tunnel within or below the ice (subglacial) or between ice walls on top of the ice of a wasting glacier and left behind as high ground when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers and in height from 3 to 30 meters.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain landforms. A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

Flood-plain splay. A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

Flood-plain step. An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Fluvial. Of or pertaining to rivers or streams; produced by stream or river action.

Footslope. The concave surface at the base of a hillslope (fig. 13). A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are bedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A small channel with steep sides caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope (geomorphology). A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway (fig. 13). The overland waterflow is converging.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope. A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill (fig. 13).

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

L horizon.—A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Ice-walled lake plain. A relict surface marking the floor of an extinct lake basin that was formed on solid ground and surrounded by stagnant ice in a stable or unstable superglacial environment on stagnation moraines. As the ice melted, the lake plain became perched above the adjacent landscape. The lake plain is well sorted, generally fine textured, stratified deposits.

Igneous rock. Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology). A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill (fig. 13); shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream. A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. See Redoximorphic features.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. A low mound, knob, hummock, or short irregular ridge composed of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier; by a supraglacial stream in a low place or hole on the surface of the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice.

Kame moraine. An end moraine that contains numerous kames. A group of kames along the front of a stagnant glacier, commonly comprising the slumped remnants of a formerly continuous outwash plain built up over the foot of rapidly wasting or stagnant ice.

Karst (topography). A kind of topography that formed in limestone, gypsum, or other soluble rocks by dissolution and that is characterized by closed depressions, sinkholes, caves, and underground drainage.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Ksat. Saturated hydraulic conductivity.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake bed. The bottom of a lake; a lake basin.

Lake plain. A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

Lake terrace. A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

Landslide. A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^{1}/_{3}$- or $^{1}/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength. The soil is not strong enough to support loads.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

Masses. See Redoximorphic features.

Meander belt. The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangential to the outer bends of active channel loops.

Meander scar. A crescent-shaped, concave or linear mark on the face of a bluff or valley wall, produced by the lateral erosion of a meandering stream that impinged upon and undercut the bluff.

Meander scroll. One of a series of long, parallel, close-fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.

Mine spoil. An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. A kind of map unit that has little or no natural soil and supports little or no vegetation.

MLRA (major land resource area). A geographic area characterized by a particular pattern of land uses, elevation and topography, soils, climate, water resources, and potential natural vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. See Redoximorphic features.

Nose slope (geomorphology). A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside (fig. 13). The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash. Stratified and sorted sediments (chiefly sand and gravel) removed or “washed out” from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

Outwash plain. An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Parts per million (ppm). The concentration of a substance in the soil, such as phosphorus or potassium, in one million parts of air-dried soil on a weight per weight basis.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. (See Saturated hydraulic conductivity.)

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Phosphorus. The amount of phosphorus available to plants at a depth of 30 to 42 inches is expressed in parts per million and based on the weighted average of air-dried soil samples. Terms describing the amount of available phosphorus are:

Very low	less than 7.5 ppm
Low	7.5 to 13.0 ppm
Medium	13.0 to 22.5 ppm
High	more than 22.5 ppm

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitted outwash plain. An outwash plain marked by many irregular depressions, such as kettles, shallow pits, and potholes, which formed by melting of incorporated ice masses.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau (geomorphology). A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings. See Redoximorphic features.

Potassium. The amount of potassium available to plants at a depth of 12 to 24 inches is expressed in parts per million and based on the weighted average of air-dried soil samples. Terms describing the amount of available potassium are:

Very low	less than 50 ppm
Low	50 to 79 ppm
Medium	79 to 125 ppm
High	more than 125 ppm

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. See Redoximorphic features.

Redoximorphic depletions. See Redoximorphic features.

Redoximorphic features. Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
   A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
   B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
   C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
   A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
   B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix. See Redoximorphic features.

Regolith. All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Rill. A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riser. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturated hydraulic conductivity (Ksat). The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy’s Law, a law that describes the rate of water movement through porous media. Commonly abbreviated as “Ksat.” Terms describing saturated hydraulic conductivity are very high, 100 or more micrometers per second (14.17 or more inches per hour); high, 10 to 100 micrometers per second (1.417 to 14.17 inches per hour); moderately high, 1 to 10 micrometers per second (0.1417 inch to 1.417 inches per hour); moderately low, 0.1 to 1 micrometer per second (0.01417 to 0.1417 inch per hour); low, 0.01 to 0.1 micrometer per second (0.001417 to 0.01417 inch per hour); and very low, less than 0.01 micrometer per second (less than 0.001417 inch per hour). To convert inches per hour to micrometers per second, multiply inches per hour by 7.0572. To convert micrometers per second to inches per hour, multiply micrometers per second by 0.1417.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike. All the soils of a given series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The convex, erosional surface near the top of a hillslope (fig. 13). A shoulder is a transition from summit to backslope.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope (geomorphology). A geomorphic component of hills consisting of a laterally planar area of a hillside (fig. 13). The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

Slickensides (pedogenic). Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, the slope classes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 5 percent
Moderately sloping	5 to 9 percent
Strongly sloping	9 to 14 percent
Steep	14 to 25 percent
Very steep	25 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slope alluvium. Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth’s surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stagnation moraine. A body of drift released by the melting of a glacier that ceased flowing. Commonly but not always occurs near ice margins; composed of till, ice-contact stratified drift, and small areas of glacial lake sediment. Typical landforms are knob-and-kettle topography, locally including ice-walled lake plains.

Stone line. In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subglacial. Formed or accumulated in or by the bottom parts of a glacier or ice sheet.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope (fig. 13). It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Swale. A slight depression in the midst of generally level land. A shallow depression in an undulating ground moraine caused by uneven glacial deposition.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terminal moraine. An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.

Terrace (conservation). An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geomorphology). A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Terracettes. Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Till. Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.

Till plain. An extensive area of level to gently undulating soils underlain predominantly by till and bounded at the distal end by subordinate recessional or end moraines.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The gently inclined surface at the base of a hillslope (fig. 13). Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread. The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Upland. An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Valley fill. The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

NRCS Accessibility Statement

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and Division of Soil
Conservation, Iowa
Department of
Agriculture and Land
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Soil Survey of Cass County, Iowa

Part II

How To Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, the survey area is divided into groups of soils called associations. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the soil associations on the color-coded map legend, and then refer to the section **General Soil Map Units** in Part I for a general description of the soils in your area.

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets** in Part III. Note the number of the map sheet, and turn to that sheet. Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. The **Contents** in Part I lists the map units and shows the page where each map unit is described.

The **Contents** in Part II shows which table has information on a specific land use or soil property for each detailed soil map unit. Also, see the **Contents** in Part I and Part II for other sections of this publication that may address your specific needs.

National Cooperative Soil Survey

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey. This survey was made cooperatively by the Natural Resources Conservation Service; the Iowa Agriculture and Home Economics Experiment Station and Cooperative Extension Service, Iowa State University; and the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship. The survey is part of the technical assistance furnished to the Cass County Soil and Water Conservation District.

Major fieldwork for this soil survey was completed in 2010. Soil names and descriptions were approved in 2010. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2010. The tables reflect the data in effect as of February 2011. The most current official data are available on the Internet (http://soils.usda.gov).

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover Photo Caption

Corn growing on an upland in an area of the Sharpsburg-Shelby association in Cass County, Iowa.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

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Soil Survey of
Cass County, Iowa

Introduction to Part II

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

This part of the soil survey includes interpretations for various uses of the soils and data on soil properties. This information can be used to plan the use and management of soils for crops and pasture or as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Even though soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of gravel, sand, reclamation material, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

The table “Classification of the Soils” is at the end of this section. Information about the system of soil taxonomy used by the Natural Resources Conservation Service is available in Part I of this publication. The extent of the map units in this survey area is shown in the table “Acreage and Proportionate Extent of the Soils.”

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text in Part I for a description of those characteristics that are outside the range of the series)

Soil name	Family or higher taxonomic class
Ackmore	Fine-silty, mixed, superactive, nonacid, mesic Mollic Fluvaquents
*Adair	Fine, smectitic, mesic Oxyaquic Vertic Hapludalfs
Ankeny	Coarse-loamy, mixed, superactive, mesic Cumulic Hapludolls
Bremer	Fine, smectitic, mesic Typic Argiaquolls
Calco	Fine-silty, mixed, superactive, calcareous, mesic Cumulic Endoaquolls
Clarinda	Fine, smectitic, mesic Vertic Argiaquolls
*Clarinda	Fine, smectitic, mesic Vertic Epiaqualfs
*Clarinda	Fine, smectitic, mesic Chromic Vertic Epiaqualfs
*Clearfield	Fine, smectitic, mesic Vertic Endoaqualfs
Colo	Fine-silty, mixed, superactive, mesic Cumulic Endoaquolls
Corley	Fine-silty, mixed, superactive, mesic Argiaquic Argialbolls
*Dickman	Sandy, mixed, mesic Dystric Eutrudepts
Ely	Fine-silty, mixed, superactive, mesic Aquic Cumulic Hapludolls
*Exira	Fine-silty, mixed, superactive, mesic Dystric Eutrudepts
*Hesch	Coarse-loamy, mixed, active, mesic Mollic Hapludalfs
Humeston	Fine, smectitic, mesic Argiaquic Argialbolls
Judson	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
Kennebec	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
*Lamoni	Fine, smectitic, mesic Vertic Epiaqualfs
*Lamoni	Fine, smectitic, mesic Chromic Vertic Epiaqualfs
Marshall	Fine-silty, mixed, superactive, mesic Typic Hapludolls
*Marshall	Fine-silty, mixed, superactive, mesic Dystric Eutrudepts
Melia	Fine-silty, mixed, superactive, mesic Pachic Hapludolls
Minden	Fine-silty, mixed, superactive, mesic Aquic Hapludolls
Mt. Sterling	Fine-silty, mixed, superactive, nonacid, mesic Aeric Fluvaquents
Nevin	Fine-silty, mixed, superactive, mesic Aquic Pachic Argiudolls
*Nira	Fine-silty, mixed, superactive, mesic Aquic Hapludalfs
Nodaway	Fine-silty, mixed, superactive, nonacid, mesic Mollic Udifluvents
Olmitz	Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls
Sharpsburg	Fine, smectitic, mesic Typic Argiudolls
*Sharpsburg	Fine, smectitic, mesic Mollic Hapludalfs
Shelby	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
*Shelby	Fine-loamy, mixed, superactive, mesic Typic Hapludalfs
*Shelby	Fine-loamy, mixed, superactive, mesic Mollic Hapludalfs

Classification of the Soils--Continued

Soil name	Family or higher taxonomic class
Vesser	Fine-silty, mixed, superactive, mesic Argiaquic Argialbolls
Wabash	Fine, smectitic, mesic Cumulic Vertic Endoaquolls
Wiota	Fine-silty, mixed, superactive, mesic Pachic Argiudolls
Zook	Fine, smectitic, mesic Cumulic Vertic Endoaquolls

Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
7	Wiota silty clay loam, 0 to 2 percent slopes, rarely flooded	413	0.1
7B	Wiota silty clay loam, 2 to 5 percent slopes, rarely flooded	67	*
9	Marshall silty clay loam, 0 to 2 percent slopes	2,051	0.6
9B	Marshall silty clay loam, 2 to 5 percent slopes	29,301	8.1
9C2	Marshall silty clay loam, 5 to 9 percent slopes, moderately eroded	29,465	8.1
9C3	Marshall silty clay loam, 5 to 9 percent slopes, severely eroded	863	0.2
9D2	Marshall silty clay loam, 9 to 14 percent slopes, moderately eroded	168	*
15B	Olmitz-Ely-Zook complex, 2 to 5 percent slopes	8	*
16	Nodaway-Kennebec complex, 0 to 2 percent slopes, occasionally flooded	4,138	1.1
43	Bremer silty clay loam, 0 to 2 percent slopes, rarely flooded	1,189	0.3
54	Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded	10,293	2.8
54+	Zook silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	6,176	1.7
88	Nevin silty clay loam, 0 to 2 percent slopes, rarely flooded	2,788	0.8
99D2	Exira silty clay loam, 9 to 14 percent slopes, moderately eroded	45,187	12.5
99D3	Exira silty clay loam, 9 to 14 percent slopes, severely eroded	3,427	0.9
99E2	Exira silty clay loam, 14 to 18 percent slopes, moderately eroded	3,918	1.1
99E3	Exira silty clay loam, 14 to 18 percent slopes, severely eroded	1,254	0.3
113B	Colo, overwash-Ely complex, 2 to 5 percent slopes	21,043	5.8
136	Ankeny fine sandy loam, 0 to 2 percent slopes, occasionally flooded	99	*
212	Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded	2,683	0.7
220	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded	12,345	3.4
229C2	Clarinda, moderately eroded-Clarinda, severely eroded, complex, 5 to 9 percent slopes	147	*
229D2	Clarinda, moderately eroded-Clarinda, severely eroded, complex, 9 to 14 percent slopes	1,194	0.3
247D2	Shelby, sandy substratum-Hesch, deep-Hesch complex, 9 to 14 percent slopes, moderately eroded	92	*
269	Humeston silty clay loam, 0 to 2 percent slopes, occasionally flooded	169	*
273B	Olmitz loam, 2 to 5 percent slopes	175	*
289D2	Dickman, loamy substratum-Marshall complex, 9 to 14 percent slopes, moderately eroded	401	0.1
300	Bremer silty clay loam, 0 to 2 percent slopes	346	*
337D2	Dickman, loamy substratum-Sharpsburg complex, 9 to 14 percent slopes, moderately eroded	24	*
370	Sharpsburg silty clay loam, 0 to 2 percent slopes	1,794	0.5
370B	Sharpsburg silty clay loam, 2 to 5 percent slopes	14,153	3.9
371C2	Sharpsburg-Nira complex, 5 to 9 percent slopes, moderately eroded	20,544	5.7
371D2	Sharpsburg-Nira complex, 9 to 14 percent slopes, moderately eroded	15,857	4.4
371E2	Sharpsburg-Nira complex, 14 to 18 percent slopes, moderately eroded	1,141	0.3
430	Ackmore silt loam, 0 to 2 percent slopes, occasionally flooded	48	*
431B	Judson-Ackmore-Colo, overwash, complex, 1 to 5 percent slopes	35,781	9.9
435	Zook-Mt. Sterling complex, 0 to 2 percent slopes, occasionally flooded	241	*
469C2	Lamoni-Clarinda-Shelby complex, 5 to 9 percent slopes, moderately eroded	1	*
469C3	Lamoni-Clarinda-Shelby complex, 5 to 9 percent slopes, severely eroded	1	*

See footnote at end of table.

Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
470D2	Lamoni-Shelby complex, 9 to 14 percent slopes, moderately eroded	4,985	1.4
509B	Marshall silty clay loam, terrace, 2 to 5 percent slopes	3,623	1.0
509C	Marshall silty clay loam, terrace, 5 to 9 percent slopes	1	*
509C2	Marshall silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded	1,574	0.4
545B	Zook-Ely-Gullied land complex, 2 to 5 percent slopes	4,198	1.2
733	Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded	98	*
803	Melia silty clay loam, terrace, 0 to 2 percent slopes	3,183	0.9
824E3	Shelby-Lamoni complex, 14 to 18 percent slopes, severely eroded	1,477	0.4
870B	Sharpsburg silty clay loam, terrace, 1 to 5 percent slopes	93	*
1239	Corley-Minden complex, terrace, 0 to 2 percent slopes	999	0.3
2428	Ely-Colo, overwash-Mt. Sterling complex, 0 to 2 percent slopes	3,128	0.9
4946C	Udorthents-Highway complex, 0 to 9 percent slopes	1,236	0.3
5030	Pits, limestone quarries	245	*
5040	Udorthents, loamy	701	0.2
5080	Udorthents, sanitary landfill	52	*
AW	Animal waste lagoon	19	*
SL	Sewage lagoon	34	*
W	Water	1,422	0.4
Y8B	Judson silty clay loam, MLRA 108D, 2 to 5 percent slopes	2,908	0.8
Y8C	Judson silty clay loam, MLRA 108D, 5 to 9 percent slopes	208	*
Y24C2	Shelby clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded	291	*
Y24D2	Shelby clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded	2,459	0.7
Y24D3	Shelby clay loam, MLRA 108D, 9 to 14 percent slopes, severely eroded	862	0.2
Y24E	Shelby clay loam, MLRA 108D, 14 to 18 percent slopes	8	*
Y24E2	Shelby clay loam, MLRA 108D, 14 to 18 percent slopes, moderately eroded	5,876	1.6
Y24E3	Shelby clay loam, MLRA 108D, 14 to 18 percent slopes, severely eroded	1,200	0.3
Y24F2	Shelby clay loam, MLRA 108D, 18 to 25 percent slopes, moderately eroded	1,195	0.3
Y24F3	Shelby clay loam, MLRA 108D, 18 to 25 percent slopes, severely eroded	400	0.1
Y82C3	Adair-Shelby complex, MLRA 108D, 5 to 9 percent slopes, severely eroded	197	*
Y93D2	Shelby-Adair complex, MLRA 108D, 9 to 14 percent slopes, moderately eroded	779	0.2
Y93D3	Shelby-Adair complex, MLRA 108D, 9 to 14 percent slopes, severely eroded	2,191	0.6
Y93E2	Shelby-Adair complex, MLRA 108D, 14 to 18 percent slopes, moderately eroded	241	*
Y192C2	Adair clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded	989	0.3
Y192D2	Adair clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded	6,123	1.7
Y222C2	Clarinda silty clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded	910	0.3
Y222D2	Clarinda silty clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded	1,174	0.3
Y222D3	Clarinda silty clay loam, MLRA 108D, 9 to 14 percent slopes, severely eroded	9	*
Z8B	Judson silty clay loam, MLRA 107B, 2 to 5 percent slopes	11,517	3.2
Z8C	Judson silty clay loam, MLRA 107B, 5 to 9 percent slopes	279	*
Z24D2	Shelby clay loam, MLRA 107B, 9 to 14 percent slopes, moderately eroded	2,865	0.8
Z24D3	Shelby clay loam, MLRA 107B, 9 to 14 percent slopes, severely eroded	362	0.1
Z24E2	Shelby clay loam, MLRA 107B, 14 to 18 percent slopes, moderately eroded	2,936	0.8
Z24E3	Shelby clay loam, MLRA 107B, 14 to 18 percent slopes, severely eroded	3,971	1.1
Z24F2	Shelby clay loam, MLRA 107B, 18 to 25 percent slopes, moderately eroded	791	0.2
Z82D3	Adair-Shelby complex, MLRA 107B, 9 to 14 percent slopes, severely eroded	13,203	3.7
Z93C2	Shelby-Adair complex, MLRA 107B, 5 to 9 percent slopes, moderately eroded	1,128	0.3
Z93D2	Shelby-Adair complex, MLRA 107B, 9 to 14 percent slopes, moderately eroded	12	*
Z93E2	Shelby-Adair complex, MLRA 107B, 14 to 18 percent slopes, moderately eroded	341	*
Z192C3	Adair clay loam, MLRA 107B, 5 to 9 percent slopes, severely eroded	220	*
Z222D2	Clarinda silty clay loam, MLRA 107B, 9 to 14 percent slopes, moderately eroded	2	*
	Total	361,700	100.0

* Less than 0.1 percent.

Agronomy

This section provides some general information about managing the soils for crops and for hay and pasture. The Iowa corn suitability rating system and the system of land capability classification used by the Natural Resources Conservation Service are explained, and the estimated yields of the main crops and hay and pasture plants are listed for each soil. Prime farmland and other categories of important farmland are described, and interpretations for windbreaks and environmental plantings and for agricultural waste management are provided.

Planners of management systems for individual fields or farms should consider obtaining specific information from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Cropland Management Considerations

The main concerns in managing nonirrigated cropland in the survey area are conserving moisture, controlling wind erosion and water erosion, and maintaining soil fertility.

Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the water infiltration rate. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Erosion is the main cause of a decrease in the content of organic matter in soils. Although it is generally not possible to increase the content of organic matter to the level that was characteristic of the native grassland, measures that control erosion can keep the content of organic matter at an acceptable level for crop growth.

Important changes took place when Cass County was settled. Breaking the prairie sod and clearing the timber removed and changed the protective plant cover. Changes caused by water erosion generally were the most significant. As the land was brought under cultivation, the runoff rate increased and the rate at which water moved into the soil decreased. As a result, accelerated erosion removed part or all of the original surface layer from many of the more sloping soils. In some areas, shallow to deep gullies have formed.

Cultivation and erosion also changed the structure and consistence of the surface layer of some soils and the content of organic matter and level of fertility. In severely eroded areas, the plow layer commonly includes the upper part of the subsoil, which is less friable and finer textured than the surface layer. Even in areas that are not subject to erosion, compaction by heavy machinery reduces the thickness of the surface layer and changes the soil structure. The granular structure of native grassland soil breaks down when these areas are intensively cropped.

Some management measures reduce the susceptibility to erosion, increase soil productivity, and reclaim areas not suitable for crops or pasture. For example, a large area of bottom land is suitable for cultivation because flooding and deposition are controlled by diversions at the base of slopes, drainage ditches, and surface drains. In some areas, erosion and runoff are controlled by terraces and filter strips

Generally, a combination of several practices is needed to control wind erosion and water erosion. Conservation tillage, stripcropping, field windbreaks, contour farming, conservation cropping systems, crop residue management, terraces, diversions, and grassed waterways help to prevent excessive soil loss.

Measures that are effective in maintaining soil fertility include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer. Many soils are more productive than they were in their natural state because applications of commercial fertilizer and lime have overcome deficiencies in plant nutrients.

Crop Yield Estimates

The tables “Land Capability, Corn Suitability Rating, and Yields per Acre of Crops” and “Land Capability and Yields per Acre of Pasture” are described in this section. Crops other than those shown in the tables are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forestland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, or wildlife habitat.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

[Reference: United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. USDA Handbook 210.]

Corn Suitability Rating

The corn suitability rating (CSR) system was developed in Iowa to rate the productivity of each different kind of soil for row crops. CSRs provide a relative ranking of all soils mapped in the State of Iowa. They can be used to compare the potential yield production of one soil with that of other soils. Ratings range from 5 to 100. A rating of 5 indicates severe limitations for row crop production. Soil properties and weather conditions are the dominant factors that affect productivity.

Crop Yields

The average yields per acre that can be expected of the principal crops under a high level of management are shown in the table. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Pasture Yields

Some pasture yields are expressed in the table in terms of animal unit months. An animal unit month (AUM) is the amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about forage yields other than those shown in the table.

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops

(The crop yield estimates are based on a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. See text for additional information)

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
7 Wiota, rarely flooded	85	1	93	211	71	116
7B Wiota, rarely flooded	85	2e	89	206	69	113
9 Marshall	90	1	88	205	69	112
9B Marshall	100	2e	85	200	67	110
9C2 Marshall, moderately eroded	80	3e	77	190	64	104
9C3 Marshall, severely eroded	80	4e	72	183	61	101
9D2 Marshall, moderately eroded	70	3e	52	156	52	86
15B			74	186	62	102
Olmitz	35	2e				
Ely	30	2e				
Zook	20	2w				
16			78	191	64	105
Nodaway, occasionally flooded	55	2w				
Kennebec, occasionally flooded	35	1				
43 Bremer, rarely flooded	80	2w	70	180	60	99
54 Zook, occasionally flooded	90	2w	59	165	55	91
54+ Zook, occasionally flooded, overwash	80	2w	63	171	57	94
88 Nevin, rarely flooded	90	1	88	205	69	112
99D2 Exira, moderately eroded	65	3e	53	157	53	86
99D3 Exira, severely eroded	75	4e	47	149	50	82

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
99E2 Exira, moderately eroded	75	4e	44	145	49	80
99E3 Exira, severely eroded	80	4e	37	136	45	75
113B			59	165	55	91
Colo, frequently flooded, overwash	50	2w				
Ely	25	2e				
136 Ankeny, occasionally flooded	95	2s	59	165	55	91
212 Kennebec, occasionally flooded	70	1	83	198	66	109
220 Nodaway, occasionally flooded	75	2w	74	186	62	102
229C2			56	161	54	89
Clarinda, moderately eroded	40	4e				
Clarinda, severely eroded	20	6e				
229D2			29	125	42	69
Clarinda, moderately eroded	55	4e				
Clarinda, severely eroded	20	6e				
247D2			34	132	44	72
Shelby, sandy substratum, moderately eroded	35	3e				
Hesch, deep, moderately eroded	25	6e				
Hesch, moderately eroded	20	6e				
269 Humeston, occasionally flooded, occasionally ponded	100	3w	40	140	47	77
273B Olmitz	80	2e	79	192	64	106
289D2			26	121	40	66
Dickman, loamy substratum, moderately eroded	35	4e				
Marshall, moderately eroded	30	3e				
300 Bremer, terrace	90	2w	71	182	61	100

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
337D2			29	125	42	69
Dickman, loamy substratum, moderately eroded	45	4e				
Sharpsburg, moderately eroded	40	3e				
370	95	1	85	200	67	110
Sharpsburg						
370B	80	2e	80	194	65	107
Sharpsburg						
371C2			69	179	60	98
Sharpsburg, moderately eroded	65	3e				
Nira, moderately eroded	30	3e				
371D2			47	149	50	82
Sharpsburg	45	3e				
Sharpsburg, moderately eroded	20	3e				
Nira, moderately eroded	20	3e				
371E2			33	130	44	72
Sharpsburg, moderately eroded	55	4e				
Nira, moderately eroded	10	4e				
430	75	2w	71	182	61	100
Ackmore, occasionally flooded						
431B			73	184	62	101
Judson	50	2e				
Ackmore, rarely flooded	25	2w				
Colo, frequently flooded, overwash	15	2w				
435			64	172	58	95
Zook, occasionally flooded	40	2w				
Mt. Sterling, occasionally flooded	35	2w				
469C2			58	164	55	90
Lamoni, moderately eroded	35	3e				
Clarinda, moderately eroded	30	4w				
Shelby, moderately eroded	20	3e				
469C3			53	157	53	86
Lamoni, severely eroded	35	4e				
Clarinda, severely eroded	30	6e				
Shelby, severely eroded	20	3e				

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
470D2			35	133	45	73
Lamoni, moderately eroded	35	4e				
Shelby, moderately eroded	25	3e				
509B	90	2e	84	199	67	110
Marshall, terrace						
509C	90	3e	81	195	65	107
Marshall, terrace						
509C2	95	3e	77	190	64	104
Marshall, terrace, moderately eroded						
545B			57	163	54	89
Zook	35	2w				
Ely	30	1				
Gullied land	20	---				
733	90	2w	72	183	61	101
Calco, occasionally flooded						
803	90	1	94	213	71	117
Melia, terrace						
824E3			23	117	39	64
Shelby, severely eroded	50	6e				
Lamoni, severely eroded	30	7e				
870B	85	2e	80	194	65	107
Sharpsburg, terrace						
1239			69	179	60	98
Corley, terrace	60	2w				
Minden, terrace	30	1				
2428			73	184	62	101
Ely	45	1				
Colo, overwash	25	2w				
Mt. Sterling	20	2w				
4946C.						
Udorthents-Interstate highway						
5030.						
Pits, limestone quarry						
5040.						
Udorthents, loamy						
5080.						
Udorthents, sanitary landfill						
AW.						
Animal waste lagoon						
SL.						
Sewage lagoon						

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
W. Water						
Y8B Judson	85	2e	85	200	67	110
Y8C Judson	85	2e	81	195	65	107
Y24C2 Shelby, moderately eroded	60	3e	68	178	59	98
Y24D2 Shelby, moderately eroded	65	3e	42	142	48	78
Y24D3 Shelby, severely eroded	55	4e	39	138	46	76
Y24E Shelby	60	4e	37	136	45	75
Y24E2 Shelby, moderately eroded	55	4e	30	126	42	69
Y24E3 Shelby, severely eroded	65	6e	27	122	41	67
Y24F2 Shelby, moderately eroded	50	6e	16	107	36	59
Y24F3 Shelby, severely eroded	55	6e	15	106	35	58
Y82C3			46	148	50	81
Adair, severely eroded	60	4e				
Shelby, severely eroded	25	3e				
Y93D2			35	133	45	73
Shelby, moderately eroded	35	3e				
Adair, moderately eroded	25	4e				
Y93D3			31	128	43	70
Shelby, severely eroded	35	4e				
Adair, severely eroded	30	6e				
Y93E2			24	118	40	65
Shelby, moderately eroded	40	4e				
Adair, moderately eroded	30	6e				
Y192C2 Adair, moderately eroded	65	3e	52	156	52	86
Y192D2 Adair, moderately eroded	55	4e	28	124	41	68

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
Y222C2------------------- Clarinda, moderately eroded	75	4w	51	155	52	85
Y222D2------------------- Clarinda, moderately eroded	60	4e	27	122	41	67
Y222D3------------------- Clarinda, severely eroded	70	6e	24	118	40	65
Z8B---------------------- Judson	80	2e	83	198	66	109
Z8C---------------------- Judson	75	3e	81	195	65	107
Z24D2-------------------- Shelby, moderately eroded	55	3e	44	145	49	80
Z24D3-------------------- Shelby, severely eroded	85	4e	40	140	47	77
Z24E2-------------------- Shelby, moderately eroded	50	4e	29	125	42	69
Z24E3-------------------- Shelby, severely eroded	55	6e	26	121	40	66
Z24F2-------------------- Shelby, moderately eroded	60	6e	17	109	36	60
Z82D3--------------------			31	128	43	70
Adair, severely eroded--	35	6e				
Shelby, severely eroded	30	4e				
Z93C2--------------------			60	167	56	92
Shelby, moderately eroded-----------------	40	3e				
Adair, moderately eroded	35	4e				
Z93D2--------------------			42	142	48	78
Shelby, moderately eroded-----------------	65	3e				
Adair, moderately eroded	20	4e				
Z93E2--------------------			26	121	40	66
Shelby, moderately eroded-----------------	45	4e				
Adair, moderately eroded	35	6e				
Z192C3------------------- Adair, severely eroded	55	4e	50	153	51	84
Z222D2------------------- Clarinda, moderately eroded	70	4e	28	124	41	68

Land Capability and Yields per Acre of Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass
		AUM*	Tons	AUM*	AUM*
7 Wiota, rarely flooded	1	8.0	6.7	4.0	6.4
7B Wiota, rarely flooded	2e	7.8	6.5	3.9	6.2
9 Marshall	1	7.8	6.5	3.8	6.2
9B Marshall	2e	7.6	6.4	3.8	6.0
9C2 Marshall, moderately eroded	3e	7.2	6.0	3.6	5.7
9C3 Marshall, severely eroded	4e	6.9	5.8	3.4	5.5
9D2 Marshall, moderately eroded	3e	5.9	5.0	2.9	4.7
15B		7.0	5.9	3.5	5.6
Olmitz	2e				
Ely	2e				
Zook	2w				
16		7.2	6.1	3.6	5.8
Nodaway, occasionally flooded	2w				
Kennebec, occasionally flooded	1				
43 Bremer, rarely flooded	2w	6.8	5.7	3.4	5.4
54 Zook, occasionally flooded	2w	6.3	5.3	3.1	5.0
54+ Zook, occasionally flooded, overwash	2w	6.5	5.4	3.2	5.2
88 Nevin, rarely flooded	1	7.8	6.5	3.8	6.2
99D2 Exira, moderately eroded	3e	6.0	5.0	2.9	4.7

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass
		AUM*	Tons	AUM*	AUM*
99D3 Exira, severely eroded	4e	5.7	4.7	2.8	4.5
99E2 Exira, moderately eroded	4e	5.5	4.6	2.7	4.4
99E3 Exira, severely eroded	4e	5.1	4.3	2.5	4.1
113B		6.3	5.3	3.1	5.0
Colo, frequently flooded, overwash	2w				
Ely	2e				
136 Ankeny, occasionally flooded	2s	6.3	5.3	3.1	5.0
212 Kennebec, occasionally flooded	1	7.5	6.3	3.7	6.0
220 Nodaway, occasionally flooded	2w	7.0	5.9	3.5	5.6
229C2		6.1	5.1	3.0	4.9
Clarinda, moderately eroded	4e				
Clarinda, severely eroded	6e				
229D2		4.7	4.0	2.3	3.8
Clarinda, moderately eroded	4e				
Clarinda, severely eroded	6e				
247D2		5.0	4.2	2.5	4.0
Shelby, sandy substratum, moderately eroded	3e				
Hesch, deep, moderately eroded	6e				
Hesch, moderately eroded	6e				
269 Humeston, occasionally flooded, occasionally ponded	3w	5.3	4.4	2.6	4.2
273B Olmitz	2e	7.3	6.1	3.6	5.8
289D2		4.6	3.8	2.3	3.6
Dickman, loamy substratum, moderately eroded	4e				
Marshall, moderately eroded	3e				

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass
		AUM*	Tons	AUM*	AUM*
300 Bremer, terrace	2w	6.9	5.8	3.4	5.5
337D2		4.7	4.0	2.3	3.8
Dickman, loamy substratum, moderately eroded	4e				
Sharpsburg, moderately eroded	3e				
370 Sharpsburg	1	7.6	6.4	3.8	6.0
370B Sharpsburg	2e	7.3	6.2	3.6	5.8
371C2		6.8	5.7	3.4	5.4
Sharpsburg, moderately eroded	3e				
Nira, moderately eroded	3e				
371D2		5.7	4.7	2.8	4.5
Sharpsburg	3e				
Sharpsburg, moderately eroded	3e				
Nira, moderately eroded	3e				
371E2		4.9	4.1	2.4	3.9
Sharpsburg, moderately eroded	4e				
Nira, moderately eroded	4e				
430 Ackmore, occasionally flooded	2w	6.9	5.8	3.4	5.5
431B		7.0	5.9	3.5	5.6
Judson	2e				
Ackmore, rarely flooded	2w				
Colo, frequently flooded, overwash	2w				
435		6.5	5.5	3.2	5.2
Zook, occasionally flooded	2w				
Mt. Sterling, occasionally flooded	2w				
469C2		6.2	5.2	3.1	4.9
Lamoni, moderately eroded	3e				
Clarinda, moderately eroded	4w				
Shelby, moderately eroded	3e				

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass
		AUM*	Tons	AUM*	AUM*
469C3		6.0	5.0	2.9	4.7
Lamoni, severely eroded	4e				
Clarinda, severely eroded	6e				
Shelby, severely eroded	3e				
470D2		5.0	4.2	2.5	4.0
Lamoni, moderately eroded	4e				
Shelby, moderately eroded	3e				
509B	2e	7.5	6.3	3.7	6.0
Marshall, terrace					
509C	3e	7.4	6.2	3.7	5.9
Marshall, terrace					
509C2	3e	7.2	6.0	3.6	5.7
Marshall, terrace, moderately eroded					
545B		6.2	5.2	3.0	4.9
Zook	2w				
Ely	1				
Gullied land	---				
733	2w	6.9	5.8	3.4	5.5
Calco, occasionally flooded					
803	1	8.1	6.8	4.0	6.4
Melia, terrace					
824E3		4.4	3.7	2.2	3.5
Shelby, severely eroded	6e				
Lamoni, severely eroded	7e				
870B	2e	7.3	6.2	3.6	5.8
Sharpsburg, terrace					
1239		6.8	5.7	3.4	5.4
Corley, terrace	2w				
Minden, terrace	1				
2428		7.0	5.9	3.5	5.6
Ely	1				
Colo, overwash	2w				
Mt. Sterling	2w				
4946C.					
Udorthents-Interstate highway					
5030.					
Pits, limestone quarry					
5040.					
Udorthents, loamy					

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass
		AUM*	Tons	AUM*	AUM*
5080. Udorthents, sanitary landfill					
AW. Animal waste lagoon					
SL. Sewage lagoon					
W. Water					
Y8B---------------------- Judson	2e	7.6	6.4	3.8	6.0
Y8C---------------------- Judson	2e	7.4	6.2	3.7	5.9
Y24C2-------------------- Shelby, moderately eroded	3e	6.7	5.6	3.3	5.4
Y24D2-------------------- Shelby, moderately eroded	3e	5.4	4.5	2.7	4.3
Y24D3-------------------- Shelby, severely eroded	4e	5.2	4.4	2.6	4.2
Y24E--------------------- Shelby	4e	5.1	4.3	2.5	4.1
Y24E2-------------------- Shelby, moderately eroded	4e	4.8	4.0	2.4	3.8
Y24E3-------------------- Shelby, severely eroded	6e	4.6	3.9	2.3	3.7
Y24F2-------------------- Shelby, moderately eroded	6e	4.1	3.4	2.0	3.2
Y24F3-------------------- Shelby, severely eroded	6e	4.0	3.4	2.0	3.2
Y82C3--------------------		5.6	4.7	2.8	4.5
Adair, severely eroded--	4e				
Shelby, severely eroded	3e				
Y93D2--------------------		5.0	4.2	2.5	4.0
Shelby, moderately eroded-----------------	3e				
Adair, moderately eroded	4e				
Y93D3--------------------		4.8	4.1	2.4	3.8
Shelby, severely eroded	4e				
Adair, severely eroded--	6e				

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass
		AUM*	Tons	AUM*	AUM*
Y93E2		4.5	3.8	2.2	3.6
Shelby, moderately eroded	4e				
Adair, moderately eroded	6e				
Y192C2 Adair, moderately eroded	3e	5.9	5.0	2.9	4.7
Y192D2 Adair, moderately eroded	4e	4.7	3.9	2.3	3.7
Y222C2 Clarinda, moderately eroded	4w	5.9	4.9	2.9	4.7
Y222D2 Clarinda, moderately eroded	4e	4.6	3.9	2.3	3.7
Y222D3 Clarinda, severely eroded	6e	4.5	3.8	2.2	3.6
Z8B Judson	2e	7.5	6.3	3.7	6.0
Z8C Judson	3e	7.4	6.2	3.7	5.9
Z24D2 Shelby, moderately eroded	3e	5.5	4.6	2.7	4.4
Z24D3 Shelby, severely eroded	4e	5.3	4.4	2.6	4.2
Z24E2 Shelby, moderately eroded	4e	4.7	4.0	2.3	3.8
Z24E3 Shelby, severely eroded	6e	4.6	3.8	2.3	3.6
Z24F2 Shelby, moderately eroded	6e	4.1	3.5	2.0	3.3
Z82D3		4.8	4.1	2.4	3.8
Adair, severely eroded	6e				
Shelby, severely eroded	4e				
Z93C2		6.3	5.3	3.1	5.0
Shelby, moderately eroded	3e				
Adair, moderately eroded	4e				
Z93D2		5.4	4.5	2.7	4.3
Shelby, moderately eroded	3e				
Adair, moderately eroded	4e				

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass
		AUM*	Tons	AUM*	AUM*
Z93E2		4.6	3.8	2.3	3.6
Shelby, moderately eroded	4e				
Adair, moderately eroded	6e				
Z192C3	4e	5.8	4.9	2.9	4.6
Adair, severely eroded					
Z222D2	4e	4.7	3.9	2.3	3.7
Clarinda, moderately eroded					

* Animal unit month: The amount of forage required to feed one mature cow, of approximately 1,000 pounds weight, with or without a calf, for 30 days.

Prime Farmland and Other Important Farmland

The table “Prime Farmland and Other Important Farmland” lists the map units in the survey area that are considered prime farmland and farmland of statewide importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation’s food supply.

Prime farmland is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

For some soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

In some areas, land that does not meet the criteria for prime farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

Prime Farmland and Other Important Farmland

(Only the soils considered prime or important farmland are listed. Urban or built-up areas of the soils listed are not considered prime or important farmland. If a soil is prime or important farmland only under certain conditions, such as "where drained," these conditions are specified)

Map symbol	Map unit name	Farmland classification
7	Wiota silty clay loam, 0 to 2 percent slopes, rarely flooded	Prime farmland
7B	Wiota silty clay loam, 2 to 5 percent slopes, rarely flooded	Prime farmland
9	Marshall silty clay loam, 0 to 2 percent slopes	Prime farmland
9B	Marshall silty clay loam, 2 to 5 percent slopes	Prime farmland
9C2	Marshall silty clay loam, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
9C3	Marshall silty clay loam, 5 to 9 percent slopes, severely eroded	Farmland of statewide importance
9D2	Marshall silty clay loam, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
15B	Olmitz-Ely-Zook complex, 2 to 5 percent slopes	Prime farmland where drained
16	Nodaway-Kennebec complex, 0 to 2 percent slopes, occasionally flooded	Prime farmland
43	Bremer silty clay loam, 0 to 2 percent slopes, rarely flooded	Prime farmland where drained
54	Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland where drained
54+	Zook silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	Prime farmland where drained
88	Nevin silty clay loam, 0 to 2 percent slopes, rarely flooded	Prime farmland
99D2	Exira silty clay loam, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
99D3	Exira silty clay loam, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance
99E2	Exira silty clay loam, 14 to 18 percent slopes, moderately eroded	Farmland of statewide importance
99E3	Exira silty clay loam, 14 to 18 percent slopes, severely eroded	Farmland of statewide importance
113B	Colo, overwash-Ely complex, 2 to 5 percent slopes	Prime farmland where drained
136	Ankeny fine sandy loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
212	Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
220	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
229C2	Clarinda, moderately eroded-Clarinda, severely eroded, complex, 5 to 9 percent slopes	Farmland of statewide importance
229D2	Clarinda, moderately eroded-Clarinda, severely eroded, complex, 9 to 14 percent slopes	Farmland of statewide importance
247D2	Shelby, sandy substratum-Hesch, deep-Hesch complex, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
269	Humeston silty clay loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland where drained
273B	Olmitz loam, 2 to 5 percent slopes	Prime farmland
289D2	Dickman, loamy substratum-Marshall complex, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
300	Bremer silty clay loam, 0 to 2 percent slopes	Prime farmland where drained
337D2	Dickman, loamy substratum-Sharpsburg complex, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
370	Sharpsburg silty clay loam, 0 to 2 percent slopes	Prime farmland
370B	Sharpsburg silty clay loam, 2 to 5 percent slopes	Prime farmland
371C2	Sharpsburg-Nira complex, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
371D2	Sharpsburg-Nira complex, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
371E2	Sharpsburg-Nira complex, 14 to 18 percent slopes, moderately eroded	Farmland of statewide importance

Prime Farmland and Other Important Farmland--Continued

Map symbol	Map unit name	Farmland classification
430	Ackmore silt loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
431B	Judson-Ackmore-Colo, overwash, complex, 1 to 5 percent slopes	Prime farmland where drained
435	Zook-Mt. Sterling complex, 0 to 2 percent slopes, occasionally flooded	Prime farmland where drained
469C2	Lamoni-Clarinda-Shelby complex, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
469C3	Lamoni-Clarinda-Shelby complex, 5 to 9 percent slopes, severely eroded	Farmland of statewide importance
470D2	Lamoni-Shelby complex, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
509B	Marshall silty clay loam, terrace, 2 to 5 percent slopes	Prime farmland
509C	Marshall silty clay loam, terrace, 5 to 9 percent slopes	Farmland of statewide importance
509C2	Marshall silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
545B	Zook-Ely-Gullied land complex, 2 to 5 percent slopes	Prime farmland where drained
733	Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland where drained
803	Melia silty clay loam, terrace, 0 to 2 percent slopes	Prime farmland
824E3	Shelby-Lamoni complex, 14 to 18 percent slopes, severely eroded	Farmland of statewide importance
870B	Sharpsburg silty clay loam, terrace, 1 to 5 percent slopes	Prime farmland
1239	Corley-Minden complex, terrace, 0 to 2 percent slopes	Prime farmland where drained
2428	Ely-Colo, overwash-Mt. Sterling complex, 0 to 2 percent slopes	Prime farmland where drained
Y8B	Judson silty clay loam, MLRA 108D, 2 to 5 percent slopes	Prime farmland
Y8C	Judson silty clay loam, MLRA 108D, 5 to 9 percent slopes	Farmland of statewide importance
Y24C2	Shelby clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
Y24D2	Shelby clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
Y24D3	Shelby clay loam, MLRA 108D, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance
Y24E	Shelby clay loam, MLRA 108D, 14 to 18 percent slopes	Farmland of statewide importance
Y24E2	Shelby clay loam, MLRA 108D, 14 to 18 percent slopes, moderately eroded	Farmland of statewide importance
Y24E3	Shelby clay loam, MLRA 108D, 14 to 18 percent slopes, severely eroded	Farmland of statewide importance
Y24F2	Shelby clay loam, MLRA 108D, 18 to 25 percent slopes, moderately eroded	Farmland of statewide importance
Y24F3	Shelby clay loam, MLRA 108D, 18 to 25 percent slopes, severely eroded	Farmland of statewide importance
Y82C3	Adair-Shelby complex, MLRA 108D, 5 to 9 percent slopes, severely eroded	Farmland of statewide importance
Y93D2	Shelby-Adair complex, MLRA 108D, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
Y93D3	Shelby-Adair complex, MLRA 108D, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance
Y93E2	Shelby-Adair complex, MLRA 108D, 14 to 18 percent slopes, moderately eroded	Farmland of statewide importance
Y192C2	Adair clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
Y192D2	Adair clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
Y222C2	Clarinda silty clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
Y222D2	Clarinda silty clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
Y222D3	Clarinda silty clay loam, MLRA 108D, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance
Z8B	Judson silty clay loam, MLRA 107B, 2 to 5 percent slopes	Prime farmland

Prime Farmland and Other Important Farmland--Continued

Map symbol	Map unit name	Farmland classification
Z8C	Judson silty clay loam, MLRA 107B, 5 to 9 percent slopes	Farmland of statewide importance
Z24D2	Shelby clay loam, MLRA 107B, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
Z24D3	Shelby clay loam, MLRA 107B, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance
Z24E2	Shelby clay loam, MLRA 107B, 14 to 18 percent slopes, moderately eroded	Farmland of statewide importance
Z24E3	Shelby clay loam, MLRA 107B, 14 to 18 percent slopes, severely eroded	Farmland of statewide importance
Z24F2	Shelby clay loam, MLRA 107B, 18 to 25 percent slopes, moderately eroded	Farmland of statewide importance
Z82D3	Adair-Shelby complex, MLRA 107B, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance
Z93C2	Shelby-Adair complex, MLRA 107B, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
Z93D2	Shelby-Adair complex, MLRA 107B, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
Z93E2	Shelby-Adair complex, MLRA 107B, 14 to 18 percent slopes, moderately eroded	Farmland of statewide importance
Z192C3	Adair clay loam, MLRA 107B, 5 to 9 percent slopes, severely eroded	Farmland of statewide importance
Z222D2	Clarinda silty clay loam, MLRA 107B, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, yards, fruit trees, gardens, and cropland from wind and snow; help to keep snow on fields; and provide food and cover for wildlife. Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

The table “Windbreaks and Environmental Plantings” shows the height that locally grown trees and shrubs are expected to reach in 20 years on soils in the survey area. The estimates in the table are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
7: Wiota, rarely flooded	Silky dogwood	American cranberrybush	Black cherry; Black Hills spruce; blue spruce; bur oak; eastern arborvitae; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
7B: Wiota, rarely flooded	Silky dogwood	American cranberrybush	Black cherry; Black Hills spruce; blue spruce; bur oak; eastern arborvitae; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
9: Marshall	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
9B:				
Marshall	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
9C2:				
Marshall, moderately eroded	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
9C3:				
Marshall, severely eroded	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
9D2:				
Marshall, moderately eroded	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
15B:				
Olmitz	---	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Ely	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak
Zook	Buttonbush; gray dogwood; ninebark; silky dogwood	Elderberry; nannyberry; redosier dogwood	Arborvitae; Washington hawthorn	Common hackberry; silver maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
16:				
Nodaway, occasionally flooded	---	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Kennebec, occasionally flooded	---	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
43:				
Bremer, rarely flooded	Buttonbush; gray dogwood; ninebark; silky dogwood	American cranberrybush; elderberry; nannyberry; redosier dogwood	Arborvitae; blue spruce; eastern arborvitae; Washington hawthorn; white fir	Common hackberry; eastern white pine; Norway spruce; silver maple
54:				
Zook, occasionally flooded	Buttonbush; gray dogwood; ninebark; silky dogwood	Elderberry; nannyberry; redosier dogwood	Arborvitae; Washington hawthorn	Common hackberry; silver maple
54+:				
Zook, occasionally flooded, overwash	Buttonbush; silky dogwood; winterberry	Elderberry; redosier dogwood	---	Common hackberry; silver maple
88:				
Nevin, rarely flooded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
99D2: Exira, moderately eroded	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
99D3: Exira, severely eroded--	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
99E2: Exira, moderately eroded	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
99E3:				
Exira, severely eroded	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
113B:				
Colo, frequently flooded, overwash	Buttonbush; silky dogwood; winterberry	Elderberry; redosier dogwood	---	Common hackberry; silver maple
Ely	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak
136:				
Ankeny, occasionally flooded	Buttonbush; gray dogwood; mapleleaf viburnum	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; sandbar willow; serviceberry; southern arrowwood	Black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	American basswood; black oak; chinkapin oak; common hackberry; common pawpaw; hickory; northern red oak; Norway spruce; red pine; white oak

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
212:				
Kennebec, occasionally flooded	---	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
220:				
Nodaway, occasionally flooded	---	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
229C2:				
Clarinda, moderately eroded	Buttonbush; gray dogwood; ninebark; silky dogwood	Elderberry; nannyberry; redosier dogwood	Arborvitae; Washington hawthorn	Common hackberry; silver maple
Clarinda, severely eroded	American cranberrybush	Eastern redcedar; southern arrowwood; Washington hawthorn	Osageorange	Eastern white pine; pin oak
229D2:				
Clarinda, moderately eroded	Buttonbush; gray dogwood; ninebark; silky dogwood	Elderberry; nannyberry; redosier dogwood	Arborvitae; Washington hawthorn	Common hackberry; silver maple
Clarinda, severely eroded	American cranberrybush	Eastern redcedar; southern arrowwood; Washington hawthorn	Osageorange	Eastern white pine; pin oak

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
247D2:				
Shelby, sandy substratum, moderately eroded	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American cranberrybush; American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blue spruce; bur oak; eastern arborvitae; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Hesch, deep, moderately eroded	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	American basswood; black oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple; white oak
Hesch, moderately eroded	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	American basswood; black oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple; white oak
269:				
Humeston, occasionally flooded, occasionally ponded	Buttonbush; gray dogwood; ninebark; silky dogwood	Elderberry; nannyberry; redosier dogwood	Arborvitae; Washington hawthorn	Common hackberry; silver maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
273B:				
Olmitz	---	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
289D2:				
Dickman, loamy substratum, moderately eroded	Gray dogwood; mapleleaf viburnum	American plum; beaked hazelnut; chokecherry; downy arrowwood; Nanking cherry; ninebark; southern arrowwood; Washington hawthorn	Black Hills spruce; blackhaw; butternut; common hackberry; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; white fir	Black oak; bur oak; northern red oak; red pine; shagbark hickory; white oak
Marshall, moderately eroded	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
300:				
Bremer, terrace	Buttonbush; gray dogwood; ninebark; silky dogwood	American cranberrybush; elderberry; nannyberry; redosier dogwood	Arborvitae; blue spruce; eastern arborvitae; Washington hawthorn; white fir	Common hackberry; eastern white pine; Norway spruce; silver maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
337D2:				
Dickman, loamy substratum, moderately eroded	Gray dogwood; mapleleaf viburnum	American plum; beaked hazelnut; chokecherry; downy arrowwood; Nanking cherry; ninebark; southern arrowwood; Washington hawthorn	Black Hills spruce; blackhaw; butternut; common hackberry; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; white fir	Black oak; bur oak; northern red oak; red pine; shagbark hickory; white oak
Sharpsburg, moderately eroded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce
370:				
Sharpsburg	Fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	American basswood; black walnut; common hackberry; hackberry; honeylocust; northern red oak; Norway spruce; red pine; shagbark hickory; silver maple; sugar maple; white oak
370B:				
Sharpsburg	Fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	American basswood; black walnut; common hackberry; honeylocust; northern red oak; Norway spruce; red pine; shagbark hickory; silver maple; sugar maple; white oak

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
371C2:				
Sharpsburg, moderately eroded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce
Nira, moderately eroded	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
371D2:				
Sharpsburg	Fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	American basswood; black walnut; common hackberry; honeylocust; northern red oak; Norway spruce; red pine; shagbark hickory; silver maple; sugar maple; white oak
Sharpsburg, moderately eroded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce
Nira, moderately eroded	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
371E2:				
Sharpsburg, moderately eroded	Gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; eastern redbud; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	American basswood; black walnut; common hackberry; northern red oak; Norway spruce; red pine; shagbark hickory; silver maple; sugar maple; white oak
Nira, moderately eroded	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
430:				
Ackmore, occasionally flooded	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; silky dogwood; winterberry	American plum; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; southern arrowwood	Arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn	Bur oak; common hackberry; common pawpaw; pin oak; river birch; swamp white oak

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
431B:				
Judson	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Ackmore, rarely flooded	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; silky dogwood; winterberry	American plum; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; southern arrowwood	Arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn	Bur oak; common hackberry; common pawpaw; pin oak; river birch; swamp white oak
Colo, frequently flooded, overwash	Buttonbush; silky dogwood; winterberry	Elderberry; redosier dogwood	---	Common hackberry; silver maple
435:				
Zook, occasionally flooded	Buttonbush; gray dogwood; ninebark; silky dogwood	Elderberry; nannyberry; redosier dogwood	Arborvitae; Washington hawthorn	Common hackberry; silver maple
Mt. Sterling, occasionally flooded	Buttonbush; silky dogwood; winterberry	Elderberry; redosier dogwood	---	Common hackberry; silver maple
469C2:				
Lamoni, moderately eroded	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
469C2:				
Clarinda, moderately eroded	Buttonbush; gray dogwood; ninebark; silky dogwood	Elderberry; nannyberry; redosier dogwood	Arborvitae; Washington hawthorn	Common hackberry; silver maple
Shelby, moderately eroded	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American cranberrybush; American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blue spruce; bur oak; eastern arborvitae; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
469C3:				
Lamoni, severely eroded	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak
Clarinda, severely eroded	American cranberrybush	Eastern redcedar; southern arrowwood; Washington hawthorn	Osageorange	Eastern white pine; pin oak
Shelby, severely eroded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
470D2:				
Lamoni, moderately eroded	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak
Shelby, moderately eroded	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American cranberrybush; American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blue spruce; bur oak; eastern arborvitae; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
509B:				
Marshall, terrace	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
509C:				
Marshall, terrace	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
509C2:				
Marshall, terrace, moderately eroded	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
545B:				
Zook	Buttonbush; gray dogwood; ninebark; silky dogwood	Elderberry; nannyberry; redosier dogwood	Arborvitae; Washington hawthorn	Common hackberry; silver maple
Ely	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak
Gullied land.				

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
733:				
Calco, occasionally flooded	Gray dogwood	American plum; Nanking cherry; nannyberry; ninebark	Common hackberry; eastern redcedar; jack pine	Bur oak; river birch; swamp white oak
803:				
Melia, terrace	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn olive; chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; silver maple
824E3:				
Shelby, severely eroded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce
Lamoni, severely eroded	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak
870B:				
Sharpsburg, terrace	Fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	American basswood; black walnut; common hackberry; honeylocust; northern red oak; Norway spruce; red pine; shagbark hickory; silver maple; sugar maple; white oak
1239:				
Corley, terrace	Buttonbush; silky dogwood; winterberry	Elderberry; redosier dogwood	---	Common hackberry; silver maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
1239:				
Minden, terrace	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; silky dogwood; winterberry	American plum; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; southern arrowwood	Arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn	Bur oak; common hackberry; common pawpaw; pin oak; river birch; swamp white oak
2428:				
Ely	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak
Colo, overwash	Buttonbush; silky dogwood; winterberry	Elderberry; redosier dogwood	---	Common hackberry; silver maple
Mt. Sterling	Buttonbush; silky dogwood; winterberry	Elderberry; redosier dogwood	---	Common hackberry; silver maple
4946C. Udorthents-Interstate highway				
5030. Pits, limestone quarry				
5040. Udorthents, loamy				
5080. Udorthents, sanitary landfill				
AW. Animal waste lagoon				
SL. Sewage lagoon				
W. Water				

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
Y8B:				
Judson	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Y8C:				
Judson	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Y24C2:				
Shelby, moderately eroded	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American cranberrybush; American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blue spruce; bur oak; eastern arborvitae; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
Y24D2: Shelby, moderately eroded	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American cranberrybush; American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blue spruce; bur oak; eastern arborvitae; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Y24D3: Shelby, severely eroded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce
Y24E: Shelby	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American cranberrybush; American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blue spruce; bur oak; eastern arborvitae; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
Y24E2:				
Shelby, moderately eroded	Buttonbush; common lilac; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; Amur maple; autumn olive; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; common hackberry; eastern redbud; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; eastern white pine; honeylocust; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Y24E3:				
Shelby, severely eroded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce
Y24F2:				
Shelby, moderately eroded	Buttonbush; common lilac; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; Amur maple; autumn olive; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; common hackberry; eastern redbud; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; eastern white pine; honeylocust; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Y24F3:				
Shelby, severely eroded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
Y82C3:				
Adair, severely eroded--	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak
Shelby, severely eroded	Silky dogwood-------	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce
Y93D2:				
Shelby, moderately eroded-----------------	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American cranberrybush; American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blue spruce; bur oak; eastern arborvitae; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Adair, moderately eroded	American cranberrybush	Eastern redcedar; southern arrowwood; Washington hawthorn	Osageorange---------	Eastern white pine; pin oak
Y93D3:				
Shelby, severely eroded	Silky dogwood-------	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
Y93D3:				
Adair, severely eroded	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak
Y93E2:				
Shelby, moderately eroded	Buttonbush; common lilac; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; Amur maple; autumn olive; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; common hackberry; eastern redbud; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; eastern white pine; honeylocust; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Adair, moderately eroded	American cranberrybush	Eastern redcedar; southern arrowwood; Washington hawthorn	Osageorange	Eastern white pine; pin oak
Y192C2:				
Adair, moderately eroded	American cranberrybush	Eastern redcedar; southern arrowwood; Washington hawthorn	Osageorange	Eastern white pine; pin oak
Y192D2:				
Adair, moderately eroded	American cranberrybush	Eastern redcedar; southern arrowwood; Washington hawthorn	Osageorange	Eastern white pine; pin oak
Y222C2:				
Clarinda, moderately eroded	Buttonbush; gray dogwood; ninebark; silky dogwood	Elderberry; nannyberry; redosier dogwood	Arborvitae; Washington hawthorn	Common hackberry; silver maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
Y222D2: Clarinda, moderately eroded	Buttonbush; gray dogwood; ninebark; silky dogwood	Elderberry; nannyberry; redosier dogwood	Arborvitae; Washington hawthorn	Common hackberry; silver maple
Y222D3: Clarinda, severely eroded	American cranberrybush	Eastern redcedar; southern arrowwood; Washington hawthorn	Osageorange	Eastern white pine; pin oak
Z8B: Judson	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Z8C: Judson	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
Z24D2:				
Shelby, moderately eroded	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American cranberrybush; American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blue spruce; bur oak; eastern arborvitae; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Z24D3:				
Shelby, severely eroded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce
Z24E2:				
Shelby, moderately eroded	Buttonbush; common lilac; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; Amur maple; autumn olive; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; common hackberry; eastern redbud; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; eastern white pine; honeylocust; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Z24E3:				
Shelby, severely eroded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
Z24F2: Shelby, moderately eroded	Buttonbush; common lilac; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; Amur maple; autumn olive; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; common hackberry; eastern redbud; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; eastern white pine; honeylocust; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Z82D3: Adair, severely eroded	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak
Shelby, severely eroded	Silky dogwood	American cranberrybush	Blue spruce; eastern arborvitae; Washington hawthorn; white fir	Norway spruce
Z93C2: Shelby, moderately eroded	Buttonbush; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American cranberrybush; American plum; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blue spruce; bur oak; eastern arborvitae; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
Z93C2:				
Adair, moderately eroded	American cranberrybush	Eastern redcedar; southern arrowwood; Washington hawthorn	Osageorange	Eastern white pine; pin oak
Z93D2:				
Shelby, moderately eroded	Buttonbush; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; beaked hazelnut; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; blackhaw; bur oak; butternut; eastern redbud; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; common pawpaw; eastern redcedar; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple
Adair, moderately eroded	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; silky dogwood; winterberry	American plum; chokecherry; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; southern arrowwood	Arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn	Bur oak; common hackberry; common pawpaw; pin oak; river birch; swamp white oak
Z93E2:				
Shelby, moderately eroded	Buttonbush; common lilac; fragrant sumac; gray dogwood; mapleleaf viburnum; silky dogwood	American plum; Amur maple; autumn olive; beaked hazelnut; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; nannyberry; ninebark; redosier dogwood; serviceberry; southern arrowwood	Arborvitae; black cherry; Black Hills spruce; bur oak; common hackberry; eastern redbud; eastern redcedar; jack pine; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black oak; black walnut; chinkapin oak; common hackberry; eastern redcedar; eastern white pine; honeylocust; northern red oak; Norway spruce; shagbark hickory; silver maple; sugar maple

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
Z93E2:				
Adair, moderately eroded	American cranberrybush	Eastern redcedar; southern arrowwood; Washington hawthorn	Osageorange---------	Eastern white pine; pin oak
Z192C3:				
Adair, severely eroded--	American cranberry viburnum; American hazelnut; buttonbush; gray dogwood; mapleleaf viburnum; nannyberry; Peking cotoneaster; silky dogwood	American plum; chokecherry; common lilac; downy arrowwood; elderberry; highbush cranberry; Nanking cherry; ninebark; redosier dogwood; sandbar willow; serviceberry; Siberian peashrub; southern arrowwood	Amur maple; arborvitae; beaked hazelnut; eastern redbud; eastern redcedar; Manchurian crabapple; Midwest crabapple; radiant crabapple; red splendor crabapple; sargent crabapple; Washington hawthorn; white fir; white spruce	Bur oak; common hackberry; honeylocust; Norway spruce; pin oak; river birch; swamp white oak
Z222D2:				
Clarinda, moderately eroded-----------------	Buttonbush; silky dogwood; winterberry	Elderberry; redosier dogwood	---	Common hackberry; silver maple

Agricultural Waste Management

The table "Agricultural Waste Management" is described in this section.

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

This table shows the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of this table, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the table are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erosion factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erosion factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

A soil feature considered in the ratings for application of manure, sewage sludge, and wastewater is depth to the top of a water table (saturated zone). During August, September, and October, this depth is generally more than 60 cm in normal years. For soils that are limited by wetness, “Nov-Jul” indicates the most problematic months of the year for application of manure, sewage sludge, and wastewater. These soils may be slow to drain and can become waterlogged and boggy during periods of heavy precipitation.

Agricultural Waste Management

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7:							
Wiota, rarely flooded	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Too acid	0.03	Too acid	0.14	Too acid	0.14
				Flooding	0.40		
7B:							
Wiota, rarely flooded	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Too acid	0.03	Too acid	0.14	Too acid	0.14
				Flooding	0.40	Too steep for surface application	0.08
9:							
Marshall	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Too acid	0.02	Too acid	0.07	Too acid	0.07
9B:							
Marshall	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Too acid	0.02	Too acid	0.07	Too acid	0.07
						Too steep for surface application	0.08
9C2:							
Marshall, moderately eroded	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07		
						Slow water movement	0.22
						Too acid	0.07
						Too steep for sprinkler application	0.02

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9C3:							
Marshall, severely eroded	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
						Too steep for sprinkler application	0.02
9D2:							
Marshall, moderately eroded	70	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Slope	0.63	Slow water movement	0.22
		Too acid	0.02	Too acid	0.07	Too steep for sprinkler application	0.78
						Too acid	0.07
15B:							
Olmitz	35	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.08
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Leaching	0.70			Too steep for surface application	0.08
Zook	20	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Runoff	0.40			Too steep for surface application	0.08
16:							
Nodaway, occasionally flooded	55	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
16:							
Kennebec, occasionally flooded	35	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
43:							
Bremer, rarely flooded	80	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Leaching	0.50	Flooding	0.40		
54:							
Zook, occasionally flooded	90	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Runoff	0.40				
54+:							
Zook, occasionally flooded, overwash	80	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Leaching	0.50				
88:							
Nevin, rarely flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Leaching	0.50	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Flooding	0.40		

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
99D2:							
Exira, moderately eroded	65	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Slope	0.63	Slow water movement	0.22
		Too acid	0.08	Too acid	0.31	Too steep for sprinkler application	0.78
						Too acid	0.31
99D3:							
Exira, severely eroded	75	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Slope	0.63	Slow water movement	0.22
		Too acid	0.08	Too acid	0.31	Too steep for sprinkler application	0.78
						Too acid	0.31
99E2:							
Exira, moderately eroded	75	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep for surface application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for sprinkler application	1.00
		Too acid	0.08	Too acid	0.31	Slow water movement	0.22
						Too acid	0.31
99E3:							
Exira, severely eroded	80	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep for surface application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for sprinkler application	1.00
		Too acid	0.08	Too acid	0.31	Slow water movement	0.22
						Too acid	0.31

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
113B:							
Colo, frequently flooded, overwash	50	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Leaching	0.50				
Ely	25	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Leaching	0.70				
136:							
Ankeny, occasionally flooded	95	Somewhat limited		Very limited		Somewhat limited	
		Filtering capacity	0.99	Flooding	1.00	Filtering capacity	0.99
		Flooding	0.60	Filtering capacity	0.99	Flooding	0.60
		Leaching	0.45				
212:							
Kennebec, occasionally flooded	70	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
220:							
Nodaway, occasionally flooded	75	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
229C2:							
Clarinda, moderately eroded	40	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Too acid	0.07
		Runoff	0.40			Too steep for sprinkler application	0.02

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
229C2:							
Clarinda, severely eroded	20	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Too acid	0.07
		Runoff	0.40			Too steep for sprinkler application	0.02
229D2:							
Clarinda, moderately eroded	55	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Too acid	0.07
		Too acid	0.02	Slope	0.63	Too steep for sprinkler application	0.78
Clarinda, severely eroded	20	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Too acid	0.07
		Too acid	0.02	Slope	0.63	Too steep for sprinkler application	0.78
247D2:							
Shelby, sandy substratum, moderately eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.67	Slow water movement	0.22
		Too acid	0.18	Slope	0.63	Too acid	0.67
						Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
247D2:							
Hesch, deep, moderately eroded	25	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Slow water movement	0.22
		Too acid	0.02	Slope	0.63	Too acid	0.07
						Too steep for sprinkler application	0.78
Hesch, moderately eroded	20	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.14	Slow water movement	0.22
		Droughty	0.67	Slope	0.63	Too acid	0.14
		Too acid	0.03	Droughty	0.67	Too steep for sprinkler application	0.78
						Droughty	0.67
269:							
Humeston, occasionally flooded, occasionally ponded	100	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	0.60	Flooding	1.00	Ponding	1.00
		Leaching	0.50	Ponding	1.00	Flooding	0.60
273B:							
Olmitz	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
						Too steep for surface application	0.08
289D2:							
Dickman, loamy substratum, moderately eroded	35	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
		Leaching	0.45			Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
289D2:							
Marshall, moderately eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Slope	0.63	Slow water movement	0.22
		Too acid	0.02	Too acid	0.07	Too steep for sprinkler application	0.78
						Too acid	0.07
300:							
Bremer, terrace	90	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Leaching	0.50				
337D2:							
Dickman, loamy substratum, moderately eroded	45	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Slope	0.63	Slow water movement	0.22
		Leaching	0.45			Too steep for sprinkler application	0.78
Sharpsburg, moderately eroded	40	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Slope	0.63	Too acid	0.67	Too steep for surface application	1.00
		Too acid	0.18	Slope	0.63	Too acid	0.67
						Too steep for sprinkler application	0.78
370:							
Sharpsburg	95	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Too acid	0.05	Too acid	0.21	Too acid	0.21

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
370B:							
Sharpsburg----------	80	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Too acid	0.05	Too acid	0.21	Too acid	0.21
						Too steep for surface application	0.08
371C2:							
Sharpsburg, moderately eroded--	65	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Too acid	0.18	Too acid	0.67	Too steep for surface application	0.92
						Too acid	0.67
						Too steep for sprinkler application	0.02
Nira, moderately eroded-------------	30	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
371D2:							
Sharpsburg----------	45	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Slope	0.63	Too acid	0.21	Too steep for surface application	1.00
		Too acid	0.05	Slope	0.63	Too acid	0.21
						Too steep for sprinkler application	0.78
Sharpsburg, moderately eroded--	20	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Slope	0.63	Too acid	0.67	Too steep for surface application	1.00
		Too acid	0.18	Slope	0.63	Too acid	0.67
						Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
371D2:							
Nira, moderately eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
371E2:							
Sharpsburg, moderately eroded	55	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Too steep	1.00	Too steep	1.00	Too steep for surface application	1.00
		Too acid	0.18	Too acid	0.67	Too steep for sprinkler application	1.00
						Too acid	0.67
Nira, moderately eroded	10	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Too steep	1.00	Too steep	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
430:							
Ackmore, occasionally flooded	75	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Flooding	1.00	Slow water movement	0.22
		Flooding	0.60	Slow water movement	0.22	Flooding	0.60
		Leaching	0.50				
431B:							
Judson	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Slow water movement	0.22	Slow water movement	0.22
						Too steep for surface application	0.08

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
431B:							
Ackmore, rarely flooded	25	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Leaching	0.50	Flooding	0.40		
Colo, frequently flooded, overwash	15	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Leaching	0.50				
435:							
Zook, occasionally flooded	40	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Runoff	0.40				
Mt. Sterling, occasionally flooded	35	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Leaching	0.50				
469C2:							
Lamoni, moderately eroded	35	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	0.92
						Too acid	0.07
		Too acid	0.02	Too acid	0.07	Too steep for sprinkler application	0.02
		Runoff	0.40				

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
469C2:							
Clarinda, moderately eroded	30	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Too acid	0.07
		Runoff	0.40			Too steep for sprinkler application	0.02
Shelby, moderately eroded	20	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
						Too steep for sprinkler application	0.02
469C3:							
Lamoni, severely eroded	35	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Too acid	0.07
		Runoff	0.40			Too steep for sprinkler application	0.02
Clarinda, severely eroded	30	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Too acid	0.07
		Runoff	0.40			Too steep for sprinkler application	0.02

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
469C3:							
Shelby, severely eroded	20	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
						Too steep for sprinkler application	0.02
470D2:							
Lamoni, moderately eroded	35	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Too acid	0.07
		Too acid	0.02	Slope	0.63	Too steep for sprinkler application	0.78
Shelby, moderately eroded	25	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Slow water movement	0.22
		Too acid	0.02	Slope	0.63	Too acid	0.07
						Too steep for sprinkler application	0.78
509B:							
Marshall, terrace	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Too acid	0.02	Too acid	0.07	Too acid	0.07
						Too steep for surface application	0.08

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
509C:							
Marshall, terrace	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
						Too steep for sprinkler application	0.02
509C2:							
Marshall, terrace, moderately eroded	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	0.92
						Slow water movement	0.22
						Too steep for sprinkler application	0.02
545B:							
Zook	35	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Runoff	0.40			Too steep for surface application	0.08
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Leaching	0.70			Too steep for surface application	0.08
Gullied land	20	Not rated		Not rated		Not rated	
733:							
Calco, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Flooding	1.00	Slow water movement	0.22
		Flooding	0.60	Slow water movement	0.22	Flooding	0.60
		Leaching	0.50				

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
803:							
Melia, terrace	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
				Too acid	0.01	Too acid	0.01
824E3:							
Shelby, severely eroded	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep for surface application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for sprinkler application	1.00
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
Lamoni, severely eroded	30	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Too steep	1.00	Too steep	1.00	Too steep for sprinkler application	1.00
		Too acid	0.02	Too acid	0.07	Too acid	0.07
870B:							
Sharpsburg, terrace	85	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Too acid	0.11	Too acid	0.42	Too acid	0.42
1239:							
Corley, terrace	60	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Leaching	0.50	Too acid	0.07	Too acid	0.07
		Too acid	0.02				
Minden, terrace	30	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Leaching	0.50				

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
2428:							
Ely	45	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Leaching	0.70				
Colo, overwash	25	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Leaching	0.50				
Mt. Sterling	20	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Leaching	0.50				
4946C:							
Udorthents	65	Not rated		Not rated		Not rated	
Interstate highway	30	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarry	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy	100	Not rated		Not rated		Not rated	
5080:							
Udorthents, sanitary landfill	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	
Y8B:							
Judson	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Slow water movement	0.22	Slow water movement	0.22
						Too steep for surface application	0.08

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y8C:							
Judson	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Too acid	0.42	Too steep for surface application	0.92
		Too acid	0.11	Slow water movement	0.22	Too acid	0.42
						Slow water movement	0.22
						Too steep for sprinkler application	0.02
Y24C2:							
Shelby, moderately eroded	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
						Too steep for sprinkler application	0.02
Y24D2:							
Shelby, moderately eroded	65	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Slow water movement	0.22
		Too acid	0.02	Slope	0.63	Too acid	0.07
						Too steep for sprinkler application	0.78
Y24D3:							
Shelby, severely eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Slow water movement	0.22
		Too acid	0.02	Slope	0.63	Too acid	0.07
						Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y24E: Shelby	60	Very limited Too steep Slow water movement Too acid	 1.00 0.30 0.05	Very limited Too steep Slow water movement Too acid	 1.00 0.22 0.21	Very limited Too steep for surface application Too steep for sprinkler application Slow water movement Too acid	 1.00 1.00 0.22 0.21
Y24E2: Shelby, moderately eroded	55	Very limited Too steep Slow water movement Too acid	 1.00 0.30 0.02	Very limited Too steep Slow water movement Too acid	 1.00 0.22 0.07	Very limited Too steep for surface application Too steep for sprinkler application Slow water movement Too acid	 1.00 1.00 0.22 0.07
Y24E3: Shelby, severely eroded	65	Very limited Too steep Slow water movement Too acid	 1.00 0.30 0.02	Very limited Too steep Slow water movement Too acid	 1.00 0.22 0.07	Very limited Too steep for surface application Too steep for sprinkler application Slow water movement Too acid	 1.00 1.00 0.22 0.07
Y24F2: Shelby, moderately eroded	50	Very limited Too steep Slow water movement Too acid	 1.00 0.30 0.02	Very limited Too steep Slow water movement Too acid	 1.00 0.22 0.07	Very limited Too steep for surface application Too steep for sprinkler application Slow water movement Too acid	 1.00 1.00 0.22 0.07

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y24F3:							
Shelby, severely eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep for surface application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for sprinkler application	1.00
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
Y82C3:							
Adair, severely eroded	60	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Too acid	0.07
		Runoff	0.40			Too steep for sprinkler application	0.02
Shelby, severely eroded	25	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
						Too steep for sprinkler application	0.02
Y93D2:							
Shelby, moderately eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Slow water movement	0.22
		Too acid	0.02	Slope	0.63	Too acid	0.07
						Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y93D2:							
Adair, moderately eroded	25	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Too acid	0.07
		Too acid	0.02	Slope	0.63	Too steep for sprinkler application	0.78
Y93D3:							
Shelby, severely eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Slow water movement	0.22
		Too acid	0.02	Slope	0.63	Too acid	0.07
						Too steep for sprinkler application	0.78
Adair, severely eroded	30	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Too acid	0.07
		Too acid	0.02	Slope	0.63	Too steep for sprinkler application	0.78
Y93E2:							
Shelby, moderately eroded	40	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep for surface application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for sprinkler application	1.00
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y93E2:							
Adair, moderately eroded	30	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Too steep	1.00	Too steep	1.00	Too steep for sprinkler application	1.00
		Too acid	0.02	Too acid	0.07	Too acid	0.07
Y192C2:							
Adair, moderately eroded	65	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Too acid	0.07
		Runoff	0.40			Too steep for sprinkler application	0.02
Y192D2:							
Adair, moderately eroded	55	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Too acid	0.07
		Too acid	0.02	Slope	0.63	Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y222C2:							
Clarinda, moderately eroded	75	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Too acid	0.07
		Runoff	0.40			Too steep for sprinkler application	0.02
Y222D2:							
Clarinda, moderately eroded	60	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Too acid	0.07
		Too acid	0.02	Slope	0.63	Too steep for sprinkler application	0.78
Y222D3:							
Clarinda, severely eroded	70	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Too acid	0.07
		Too acid	0.02	Slope	0.63	Too steep for sprinkler application	0.78
Z8B:							
Judson	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Slow water movement	0.22	Slow water movement	0.22
						Too steep for surface application	0.08

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z8C:							
Judson	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Too acid	0.42	Too steep for surface application	0.92
		Too acid	0.11	Slow water movement	0.22	Too acid	0.42
						Slow water movement	0.22
						Too steep for sprinkler application	0.02
Z24D2:							
Shelby, moderately eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Slow water movement	0.22
		Too acid	0.02	Slope	0.63	Too acid	0.07
						Too steep for sprinkler application	0.78
Z24D3:							
Shelby, severely eroded	85	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Slow water movement	0.22
		Too acid	0.02	Slope	0.63	Too acid	0.07
						Too steep for sprinkler application	0.78
Z24E2:							
Shelby, moderately eroded	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep for surface application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for sprinkler application	1.00
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z24E3:							
Shelby, severely eroded-------------	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep for surface application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for sprinkler application	1.00
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
Z24F2:							
Shelby, moderately eroded-------------	60	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep for surface application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for sprinkler application	1.00
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
Z82D3:							
Adair, severely eroded-------------	35	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Too acid	0.07
		Too acid	0.02	Slope	0.63	Too steep for sprinkler application	0.78
Shelby, severely eroded-------------	30	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Slow water movement	0.22
		Too acid	0.02	Slope	0.63	Too acid	0.07
						Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z93C2:							
Shelby, moderately eroded	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
						Too steep for sprinkler application	0.02
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Too acid	0.07
		Runoff	0.40			Too steep for sprinkler application	0.02
Z93D2:							
Shelby, moderately eroded	65	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Slow water movement	0.22
		Too acid	0.02	Slope	0.63	Too acid	0.07
						Too steep for sprinkler application	0.78
Adair, moderately eroded	20	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Too acid	0.07
		Too acid	0.02	Slope	0.63	Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
Z93E2:							
Shelby, moderately eroded	45	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep for surface application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for sprinkler application	1.00
		Too acid	0.02	Too acid	0.07	Slow water movement	0.22
						Too acid	0.07
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Too steep	1.00	Too steep	1.00	Too steep for sprinkler application	1.00
		Too acid	0.02	Too acid	0.07	Too acid	0.07
Z192C3:							
Adair, severely eroded	55	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	0.92
		Too acid	0.02	Too acid	0.07	Too acid	0.07
		Runoff	0.40			Too steep for sprinkler application	0.02
Z222D2:							
Clarinda, moderately eroded	70	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Strongly contrasting textural stratification	1.00	Strongly contrasting textural stratification	1.00	Too steep for surface application	1.00
		Slope	0.63	Too acid	0.07	Too acid	0.07
		Too acid	0.02	Slope	0.63	Too steep for sprinkler application	0.78

Recreational Development

The titles of the tables described in this section are:

- “Camp Areas, Picnic Areas, and Playgrounds”
- “Paths, Trails, and Golf Fairways”

In the tables described in this section, the soils of the survey area are rated according to limitations that affect their suitability for recreational development. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in these tables can be supplemented by other information in this survey, for example, interpretations for dwellings without basements, for local roads and streets, and for septic tank absorption fields.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Camp Areas, Picnic Areas, and Playgrounds

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7:							
Wiota, rarely flooded	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Slow water movement	0.15	Slow water movement	0.15
		Slow water movement	0.15				
7B:							
Wiota, rarely flooded	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Slow water movement	0.15	Slow water movement	0.15
		Slow water movement	0.15			Slope	0.50
9:							
Marshall	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
9B:							
Marshall	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
						Slope	0.50
9C2:							
Marshall, moderately eroded	80	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.15	Slow water movement	0.15	Slope	1.00
						Slow water movement	0.15
9C3:							
Marshall, severely eroded	80	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.15	Slow water movement	0.15	Slope	1.00
						Slow water movement	0.15
9D2:							
Marshall, moderately eroded	70	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
15B:							
Olmitz	35	Not limited		Not limited		Somewhat limited	
						Slope	0.50

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15B:							
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Slope	0.50
Zook	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
						Slope	0.50
16:							
Nodaway, occasionally flooded	55	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
Kennebec, occasionally flooded	35	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
43:							
Bremer, rarely flooded	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slow water movement	0.99	Slow water movement	0.99
		Slow water movement	0.99				
54:							
Zook, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Flooding	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00			Flooding	0.60
54+:							
Zook, occasionally flooded, overwash	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slow water movement	0.99	Slow water movement	0.99
		Slow water movement	0.99			Flooding	0.60
88:							
Nevin, rarely flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slow water movement	0.15	Slow water movement	0.15
		Slow water movement	0.15				

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99D2:							
Exira, moderately eroded	65	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
99D3:							
Exira, severely eroded	75	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
99E2:							
Exira, moderately eroded	75	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
99E3:							
Exira, severely eroded	80	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
113B:							
Colo, frequently flooded, overwash	50	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slow water movement	0.15	Flooding	1.00
		Slow water movement	0.15	Flooding	0.40	Slow water movement	0.15
						Slope	0.12
Ely	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Slope	0.12
136:							
Ankeny, occasionally flooded	95	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
212:							
Kennebec, occasionally flooded	70	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
220:							
Nodaway, occasionally flooded	75	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
229C2:							
Clarinda, moderately eroded--	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
						Slope	1.00
Clarinda, severely eroded-------------	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Too clayey	1.00	Slope	1.00
						Too clayey	1.00
229D2:							
Clarinda, moderately eroded--	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Slope	1.00
Clarinda, severely eroded-------------	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Too clayey	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Too clayey	1.00
247D2:							
Shelby, sandy substratum, moderately eroded--	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Hesch, deep, moderately eroded--	25	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Hesch, moderately eroded-------------	20	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
						Gravel	0.08

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
269:							
Humeston, occasionally flooded, occasionally ponded	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Slow water movement	0.99	Slow water movement	0.99
		Slow water movement	0.99			Flooding	0.60
273B:							
Olmitz	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
						Slope	0.50
289D2:							
Dickman, loamy substratum, moderately eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
Marshall, moderately eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
300:							
Bremer, terrace	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.99	Slow water movement	0.99	Slow water movement	0.99
337D2:							
Dickman, loamy substratum, moderately eroded	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
Sharpsburg, moderately eroded	40	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.99	Slow water movement	0.99	Slope	1.00
		Slope	0.63	Slope	0.63	Slow water movement	0.99
370:							
Sharpsburg	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.99	Slow water movement	0.99	Slow water movement	0.99
370B:							
Sharpsburg	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.99	Slow water movement	0.99	Slow water movement	0.99
						Slope	0.50

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
371C2:							
Sharpsburg, moderately eroded	65	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.99	Slow water movement	0.99	Slope	1.00
						Slow water movement	0.99
Nira, moderately eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Slope	1.00
						Depth to saturated zone	0.39
371D2:							
Sharpsburg	45	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.99	Slow water movement	0.99	Slope	1.00
		Slope	0.63	Slope	0.63	Slow water movement	0.99
Sharpsburg, moderately eroded	20	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.99	Slow water movement	0.99	Slope	1.00
		Slope	0.63	Slope	0.63	Slow water movement	0.99
Nira, moderately eroded	20	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Depth to saturated zone	0.39
371E2:							
Sharpsburg, moderately eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.99	Slow water movement	0.99	Slow water movement	0.99
Nira, moderately eroded	10	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Depth to saturated zone	0.39
430:							
Ackmore, occasionally flooded	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slow water movement	0.15	Slow water movement	0.15
		Slow water movement	0.15			Flooding	0.60
431B:							
Judson	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
						Slope	0.50

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
431B:							
Ackmore, rarely flooded	25	Very limited Depth to saturated zone Flooding Slow water movement	 1.00 1.00 0.15	Very limited Depth to saturated zone Slow water movement	 1.00 0.15	Very limited Depth to saturated zone Slow water movement	 1.00 0.15
Colo, frequently flooded, overwash	15	Very limited Depth to saturated zone Flooding Slow water movement	 1.00 1.00 0.15	Very limited Depth to saturated zone Slow water movement Flooding	 1.00 0.15 0.40	Very limited Depth to saturated zone Flooding Slow water movement	 1.00 1.00 0.15
435:							
Zook, occasionally flooded	40	Very limited Depth to saturated zone Flooding Slow water movement	 1.00 1.00 1.00	Very limited Depth to saturated zone Slow water movement	 1.00 1.00	Very limited Slow water movement Depth to saturated zone Flooding	 1.00 1.00 0.60
Mt. Sterling, occasionally flooded	35	Very limited Depth to saturated zone Flooding Slow water movement	 1.00 1.00 0.99	Very limited Depth to saturated zone Slow water movement	 1.00 0.99	Very limited Depth to saturated zone Slow water movement Flooding	 1.00 0.99 0.60
469C2:							
Lamoni, moderately eroded	35	Very limited Depth to saturated zone Slow water movement	 1.00 1.00	Very limited Depth to saturated zone Slow water movement	 1.00 1.00	Very limited Slow water movement Depth to saturated zone Slope	 1.00 1.00 1.00
Clarinda, moderately eroded	30	Very limited Depth to saturated zone Slow water movement	 1.00 1.00	Very limited Depth to saturated zone Slow water movement	 1.00 1.00	Very limited Slow water movement Depth to saturated zone Slope	 1.00 1.00 1.00
Shelby, moderately eroded	20	Somewhat limited Slow water movement	 0.15	Somewhat limited Slow water movement	 0.15	Very limited Slope Slow water movement	 1.00 0.15

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
469C3:							
Lamoni, severely eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
						Slope	1.00
Clarinda, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Too clayey	1.00	Slope	1.00
						Too clayey	1.00
Shelby, severely eroded	20	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.15	Slow water movement	0.15	Slope	1.00
						Slow water movement	0.15
470D2:							
Lamoni, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Slope	1.00
Shelby, moderately eroded	25	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
509B:							
Marshall, terrace	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
						Slope	0.50
509C:							
Marshall, terrace	90	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.15	Slow water movement	0.15	Slope	1.00
						Slow water movement	0.15
509C2:							
Marshall, terrace, moderately eroded	95	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.15	Slow water movement	0.15	Slope	1.00
						Slow water movement	0.15

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
545B:							
Zook	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
						Slope	0.50
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Slope	0.50
Gullied land	20	Not rated		Not rated		Not rated	
733:							
Calco, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slow water movement	0.15	Slow water movement	0.15
		Slow water movement	0.15			Flooding	0.60
803:							
Melia, terrace	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
824E3:							
Shelby, severely eroded	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Lamoni, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
		Too steep	1.00	Too steep	1.00	Slope	1.00
870B:							
Sharpsburg, terrace	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.99	Slow water movement	0.99	Slow water movement	0.99
						Slope	0.12
1239:							
Corley, terrace	60	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1239:							
Minden, terrace	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
2428:							
Ely	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Colo, overwash	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slow water movement	0.15	Flooding	1.00
		Slow water movement	0.15	Flooding	0.40	Slow water movement	0.15
Mt. Sterling	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slow water movement	0.99	Flooding	1.00
		Slow water movement	0.99	Flooding	0.40	Slow water movement	0.99
4946C:							
Udorthents	65	Not rated		Not rated		Not rated	
Interstate highway	30	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarry	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy	100	Not rated		Not rated		Not rated	
5080:							
Udorthents, sanitary landfill	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	
Y8B:							
Judson	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
						Slope	0.50

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
Y8C:							
Judson	85	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.15	Slow water movement	0.15	Slope	1.00
						Slow water movement	0.15
Y24C2:							
Shelby, moderately eroded	60	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.15	Slow water movement	0.15	Slope	1.00
						Slow water movement	0.15
Y24D2:							
Shelby, moderately eroded	65	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Y24D3:							
Shelby, severely eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Y24E:							
Shelby	60	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Y24E2:							
Shelby, moderately eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Y24E3:							
Shelby, severely eroded	65	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Y24F2:							
Shelby, moderately eroded	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Y24F3:							
Shelby, severely eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y82C3:							
Adair, severely eroded	60	Very limited Depth to saturated zone Slow water movement	 1.00 1.00	Very limited Depth to saturated zone Slow water movement	 1.00 1.00	Very limited Slow water movement Depth to saturated zone Slope	 1.00 1.00 1.00
Shelby, severely eroded	25	Somewhat limited Slow water movement	 0.15	Somewhat limited Slow water movement	 0.15	Very limited Slope Slow water movement	 1.00 0.15
Y93D2:							
Shelby, moderately eroded	35	Somewhat limited Slope Slow water movement	 0.63 0.15	Somewhat limited Slope Slow water movement	 0.63 0.15	Very limited Slope Slow water movement	 1.00 0.15
Adair, moderately eroded	25	Very limited Depth to saturated zone Slow water movement Slope	 1.00 1.00 0.63	Very limited Depth to saturated zone Slow water movement Slope	 1.00 1.00 0.63	Very limited Slow water movement Depth to saturated zone Slope	 1.00 1.00 1.00
Y93D3:							
Shelby, severely eroded	35	Somewhat limited Slope Slow water movement	 0.63 0.15	Somewhat limited Slope Slow water movement	 0.63 0.15	Very limited Slope Slow water movement	 1.00 0.15
Adair, severely eroded	30	Very limited Depth to saturated zone Slow water movement Slope	 1.00 1.00 0.63	Very limited Depth to saturated zone Slow water movement Slope	 1.00 1.00 0.63	Very limited Slow water movement Depth to saturated zone Slope	 1.00 1.00 1.00
Y93E2:							
Shelby, moderately eroded	40	Very limited Too steep Slow water movement	 1.00 0.15	Very limited Too steep Slow water movement	 1.00 0.15	Very limited Slope Slow water movement	 1.00 0.15
Adair, moderately eroded	30	Very limited Depth to saturated zone Slow water movement Too steep	 1.00 1.00 1.00	Very limited Depth to saturated zone Slow water movement Too steep	 1.00 1.00 1.00	Very limited Slow water movement Depth to saturated zone Slope	 1.00 1.00 1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y192C2:							
Adair, moderately eroded	65	Very limited Depth to saturated zone Slow water movement	 1.00 1.00	Very limited Depth to saturated zone Slow water movement	 1.00 1.00	Very limited Slow water movement Depth to saturated zone Slope	 1.00 1.00 1.00
Y192D2:							
Adair, moderately eroded	55	Very limited Depth to saturated zone Slow water movement Slope	 1.00 1.00 0.63	Very limited Depth to saturated zone Slow water movement Slope	 1.00 1.00 0.63	Very limited Slow water movement Depth to saturated zone Slope	 1.00 1.00 1.00
Y222C2:							
Clarinda, moderately eroded	75	Very limited Depth to saturated zone Slow water movement	 1.00 1.00	Very limited Depth to saturated zone Slow water movement	 1.00 1.00	Very limited Slow water movement Depth to saturated zone Slope	 1.00 1.00 1.00
Y222D2:							
Clarinda, moderately eroded	60	Very limited Depth to saturated zone Slow water movement Slope	 1.00 1.00 0.63	Very limited Depth to saturated zone Slow water movement Slope	 1.00 1.00 0.63	Very limited Slow water movement Depth to saturated zone Slope	 1.00 1.00 1.00
Y222D3:							
Clarinda, severely eroded	70	Very limited Depth to saturated zone Slow water movement Too clayey Slope	 1.00 1.00 1.00 0.63	Very limited Depth to saturated zone Slow water movement Too clayey Slope	 1.00 1.00 1.00 0.63	Very limited Slow water movement Depth to saturated zone Slope Too clayey	 1.00 1.00 1.00 1.00
Z8B:							
Judson	80	Somewhat limited Slow water movement	 0.15	Somewhat limited Slow water movement	 0.15	Somewhat limited Slow water movement Slope	 0.15 0.50
Z8C:							
Judson	75	Somewhat limited Slow water movement	 0.15	Somewhat limited Slow water movement	 0.15	Very limited Slope Slow water movement	 1.00 0.15

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z24D2: Shelby, moderately eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Z24D3: Shelby, severely eroded	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Z24E2: Shelby, moderately eroded	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Z24E3: Shelby, severely eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Z24F2: Shelby, moderately eroded	60	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Z82D3: Adair, severely eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Slope	1.00
Shelby, severely eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Z93C2: Shelby, moderately eroded	40	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.15	Slow water movement	0.15	Slope	1.00
						Slow water movement	0.15

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z93C2:							
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
						Slope	1.00
Z93D2:							
Shelby, moderately eroded	65	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Adair, moderately eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Slope	1.00
Z93E2:							
Shelby, moderately eroded	45	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
		Too steep	1.00	Too steep	1.00	Slope	1.00
Z192C3:							
Adair, severely eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
						Slope	1.00
Z222D2:							
Clarinda, moderately eroded	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Slope	1.00

Paths, Trails, and Golf Fairways

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7:							
Wiota, rarely flooded	85	Not limited		Not limited		Not limited	
7B:							
Wiota, rarely flooded	85	Not limited		Not limited		Not limited	
9:							
Marshall	90	Not limited		Not limited		Not limited	
9B:							
Marshall	100	Not limited		Not limited		Not limited	
9C2:							
Marshall, moderately eroded	80	Not limited		Not limited		Not limited	
9C3:							
Marshall, severely eroded	80	Not limited		Not limited		Not limited	
9D2:							
Marshall, moderately eroded	70	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
15B:							
Olmitz	35	Not limited		Not limited		Not limited	
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Zook	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
16:							
Nodaway, occasionally flooded	55	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
Kennebec, occasionally flooded	35	Not limited		Not limited		Very limited	
						Too dense	1.00
						Flooding	0.60

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
43:							
Bremer, rarely flooded	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
54:							
Zook, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
54+:							
Zook, occasionally flooded, overwash	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
88:							
Nevin, rarely flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
99D2:							
Exira, moderately eroded	65	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
99D3:							
Exira, severely eroded	75	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
99E2:							
Exira, moderately eroded	75	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Too steep	1.00
		Slope	0.02				
99E3:							
Exira, severely eroded	80	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Too steep	1.00
		Slope	0.02				
113B:							
Colo, frequently flooded, overwash	50	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Depth to saturated zone	1.00
Ely	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
136:							
Ankeny, occasionally flooded	95	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
212:							
Kennebec, occasionally flooded	70	Not limited		Not limited		Very limited	
						Too dense	1.00
						Flooding	0.60
220:							
Nodaway, occasionally flooded	75	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
229C2:							
Clarinda, moderately eroded	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Clarinda, severely eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
229D2:							
Clarinda, moderately eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
Clarinda, severely eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
						Slope	0.63
247D2:							
Shelby, sandy substratum, moderately eroded	35	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
Hesch, deep, moderately eroded	25	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
Hesch, moderately eroded	20	Not limited		Not limited		Somewhat limited	
						Slope	0.63

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
269:							
Humeston, occasionally flooded, occasionally ponded	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
						Flooding	0.60
273B:							
Olmitz	80	Not limited		Not limited		Not limited	
289D2:							
Dickman, loamy substratum, moderately eroded	35	Not limited		Not limited		Somewhat limited	
						Slope	0.63
Marshall, moderately eroded	30	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
300:							
Bremer, terrace	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
337D2:							
Dickman, loamy substratum, moderately eroded	45	Not limited		Not limited		Somewhat limited	
						Slope	0.63
Sharpsburg, moderately eroded	40	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
370:							
Sharpsburg	95	Not limited		Not limited		Not limited	
370B:							
Sharpsburg	80	Not limited		Not limited		Not limited	
371C2:							
Sharpsburg, moderately eroded	65	Not limited		Not limited		Not limited	
Nira, moderately eroded	30	Not limited		Not limited		Somewhat limited	
						Depth to saturated zone	0.19
371D2:							
Sharpsburg	45	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
371D2:							
Sharpsburg, moderately eroded	20	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
Nira, moderately eroded	20	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
						Depth to saturated zone	0.19
371E2:							
Sharpsburg, moderately eroded	55	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Too steep	1.00
		Slope	0.02				
Nira, moderately eroded	10	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Too steep	1.00
		Slope	0.02			Depth to saturated zone	0.19
430:							
Ackmore, occasionally flooded	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
431B:							
Judson	50	Not limited		Not limited		Not limited	
Ackmore, rarely flooded	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Colo, frequently flooded, overwash	15	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Depth to saturated zone	1.00
435:							
Zook, occasionally flooded	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
Mt. Sterling, occasionally flooded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
469C2:							
Lamoni, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Clarinda, moderately eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Shelby, moderately eroded	20	Not limited		Not limited		Not limited	
469C3:							
Lamoni, severely eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Clarinda, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
Shelby, severely eroded	20	Not limited		Not limited		Not limited	
470D2:							
Lamoni, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
Shelby, moderately eroded	25	Not limited		Not limited		Somewhat limited	
						Slope	0.63
509B:							
Marshall, terrace	90	Not limited		Not limited		Not limited	
509C:							
Marshall, terrace	90	Not limited		Not limited		Not limited	
509C2:							
Marshall, terrace, moderately eroded	95	Not limited		Not limited		Not limited	
545B:							
Zook	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Gullied land	20	Not rated		Not rated		Not rated	

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
733:							
Calco, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
803:							
Melia, terrace	90	Not limited		Not limited		Not limited	
824E3:							
Shelby, severely eroded	50	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Too steep	1.00
Lamoni, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.02			Too steep	1.00
870B:							
Sharpsburg, terrace	85	Not limited		Not limited		Not limited	
1239:							
Corley, terrace	60	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Minden, terrace	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
2428:							
Ely	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Colo, overwash	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Depth to saturated zone	1.00
Mt. Sterling	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	0.40	Flooding	0.40	Flooding	1.00
4946C:							
Udorthents	65	Not rated		Not rated		Not rated	
Interstate highway	30	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarry	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy	100	Not rated		Not rated		Not rated	

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5080:							
Udorthents, sanitary landfill	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	
Y8B:							
Judson	85	Not limited		Not limited		Not limited	
Y8C:							
Judson	85	Not limited		Not limited		Not limited	
Y24C2:							
Shelby, moderately eroded	60	Not limited		Not limited		Not limited	
Y24D2:							
Shelby, moderately eroded	65	Not limited		Not limited		Somewhat limited	
						Slope	0.63
Y24D3:							
Shelby, severely eroded	55	Not limited		Not limited		Somewhat limited	
						Slope	0.63
Y24E:							
Shelby	60	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Too steep	1.00
Y24E2:							
Shelby, moderately eroded	55	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Too steep	1.00
Y24E3:							
Shelby, severely eroded	65	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Too steep	1.00
Y24F2:							
Shelby, moderately eroded	50	Somewhat limited		Not limited		Very limited	
		Slope	0.82			Too steep	1.00
Y24F3:							
Shelby, severely eroded	55	Somewhat limited		Not limited		Very limited	
		Slope	0.82			Too steep	1.00

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y82C3:							
Adair, severely eroded	60	Very limited Depth to saturated zone	 1.00	Very limited Depth to saturated zone	 1.00	Very limited Depth to saturated zone	 1.00
Shelby, severely eroded	25	Not limited		Not limited		Not limited	
Y93D2:							
Shelby, moderately eroded	35	Not limited		Not limited		Somewhat limited Slope	 0.63
Adair, moderately eroded	25	Very limited Depth to saturated zone Water erosion	 1.00 1.00	Very limited Depth to saturated zone Water erosion	 1.00 1.00	Very limited Depth to saturated zone Slope	 1.00 0.63
Y93D3:							
Shelby, severely eroded	35	Not limited		Not limited		Somewhat limited Slope	 0.63
Adair, severely eroded	30	Very limited Depth to saturated zone Water erosion	 1.00 1.00	Very limited Depth to saturated zone Water erosion	 1.00 1.00	Very limited Depth to saturated zone Slope	 1.00 0.63
Y93E2:							
Shelby, moderately eroded	40	Somewhat limited Slope	 0.02	Not limited		Very limited Too steep	 1.00
Adair, moderately eroded	30	Very limited Depth to saturated zone Water erosion Slope	 1.00 1.00 0.02	Very limited Depth to saturated zone Water erosion	 1.00 1.00	Very limited Depth to saturated zone Too steep	 1.00 1.00
Y192C2:							
Adair, moderately eroded	65	Very limited Depth to saturated zone	 1.00	Very limited Depth to saturated zone	 1.00	Very limited Depth to saturated zone	 1.00
Y192D2:							
Adair, moderately eroded	55	Very limited Depth to saturated zone Water erosion	 1.00 1.00	Very limited Depth to saturated zone Water erosion	 1.00 1.00	Very limited Depth to saturated zone Slope	 1.00 0.63

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y222C2:							
Clarinda, moderately eroded	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Y222D2:							
Clarinda, moderately eroded	60	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
Y222D3:							
Clarinda, severely eroded	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
						Slope	0.63
Z8B:							
Judson	80	Not limited		Not limited		Not limited	
Z8C:							
Judson	75	Not limited		Not limited		Not limited	
Z24D2:							
Shelby, moderately eroded	55	Not limited		Not limited		Somewhat limited	
						Slope	0.63
Z24D3:							
Shelby, severely eroded	85	Not limited		Not limited		Somewhat limited	
						Slope	0.63
Z24E2:							
Shelby, moderately eroded	50	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Too steep	1.00
Z24E3:							
Shelby, severely eroded	55	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Too steep	1.00
Z24F2:							
Shelby, moderately eroded	60	Somewhat limited		Not limited		Very limited	
		Slope	0.82			Too steep	1.00
Z82D3:							
Adair, severely eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Water erosion	1.00	Water erosion	1.00	Slope	0.63

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z82D3:							
Shelby, severely eroded	30	Not limited		Not limited		Somewhat limited	
						Slope	0.63
Z93C2:							
Shelby, moderately eroded	40	Not limited		Not limited		Not limited	
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Z93D2:							
Shelby, moderately eroded	65	Not limited		Not limited		Somewhat limited	
						Slope	0.63
Adair, moderately eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
Z93E2:							
Shelby, moderately eroded	45	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Too steep	1.00
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Water erosion	1.00	Water erosion	1.00	Too steep	1.00
		Slope	0.02				
Z192C3:							
Adair, severely eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Z222D2:							
Clarinda, moderately eroded	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Water erosion	1.00	Water erosion	1.00	Slope	0.63

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In the table described in this section, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness.

Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn olive and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Potential for habitat elements							Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
7:										
Wiota, rarely flooded	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
7B:										
Wiota, rarely flooded	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
9:										
Marshall	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
9B:										
Marshall	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
9C2:										
Marshall, moderately eroded	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
9C3:										
Marshall, severely eroded	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
9D2:										
Marshall, moderately eroded	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
15B:										
Olmitz	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor
Ely	Good	Good	Good	Good	Good	Fair	Very poor	Good	Good	Poor
Zook	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good
16:										
Nodaway, occasionally flooded	Good	Good	Good	Good	Fair	Fair	Poor	Fair	Good	Fair
Kennebec, occasionally flooded	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
43:										
Bremer, rarely flooded	Good	Good	Good	Fair	Poor	Good	Good	Good	Fair	Good
54:										
Zook, occasionally flooded	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good
54+:										
Zook, occasionally flooded, overwash	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good
88:										
Nevin, rarely flooded	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
99D2:										
Exira, moderately eroded	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor
99D3:										
Exira, severely eroded	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor
99E2:										
Exira, moderately eroded	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor
99E3:										
Exira, severely eroded	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor
113B:										
Colo, frequently flooded, overwash	Good	Fair	Good	Fair	Poor	Fair	Fair	Fair	Fair	Good
Ely	Good	Good	Good	Good	Good	Fair	Very poor	Good	Good	Poor
136:										
Ankeny, occasionally flooded	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
212:										
Kennebec, occasionally flooded	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
220:										
Nodaway, occasionally flooded	Good	Good	Good	Good	Fair	Fair	Poor	Fair	Good	Fair
229C2:										
Clarinda, moderately eroded	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor
Clarinda, severely eroded	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor
229D2:										
Clarinda, moderately eroded	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor
Clarinda, severely eroded	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor
247D2:										
Shelby, sandy substratum, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Hesch, deep, moderately eroded	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Hesch, moderately eroded	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
269:										
Humeston, occasionally flooded, occasionally ponded	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good
273B:										
Olmitz	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor
289D2:										
Dickman, loamy substratum, moderately eroded	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Marshall, moderately eroded	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
300:										
Bremer, terrace	Good	Good	Good	Fair	Poor	Good	Good	Good	Fair	Good
337D2:										
Dickman, loamy substratum, moderately eroded	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Sharpsburg, moderately eroded	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
370:										
Sharpsburg	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
370B:										
Sharpsburg	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
371C2:										
Sharpsburg, moderately eroded	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Nira, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Poor	Fair	Good	Very poor
371D2:										
Sharpsburg	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Sharpsburg, moderately eroded	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Nira, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Poor	Fair	Good	Very poor
371E2:										
Sharpsburg, moderately eroded	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Nira, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Poor	Fair	Good	Very poor
430:										
Ackmore, occasionally flooded	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
431B:										
Judson	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Ackmore, rarely flooded	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Colo, frequently flooded, overwash	Good	Fair	Good	Fair	Poor	Fair	Fair	Fair	Fair	Good
435:										
Zook, occasionally flooded	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good
Mt. Sterling, occasionally flooded	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
469C2:										
Lamoni, moderately eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Clarinda, moderately eroded	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
469C3:										
Lamoni, severely eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Clarinda, severely eroded	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor
Shelby, severely eroded	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
470D2:										
Lamoni, moderately eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
509B:										
Marshall, terrace	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
509C:										
Marshall, terrace	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
509C2:										
Marshall, terrace, moderately eroded	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
545B:										
Zook	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good
Ely	Good	Good	Good	Good	Good	Fair	Very poor	Good	Good	Poor

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
545B: Gullied land.										
733: Calco, occasionally flooded	Good	Fair	Good	Poor	Very poor	Good	Good	Fair	Poor	Fair
803: Melia, terrace	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
824E3: Shelby, severely eroded	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Lamoni, severely eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
870B: Sharpsburg, terrace	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
1239: Corley, terrace	Good	Good	Good	Good	Fair	Good	Good	Good	Good	Good
Minden, terrace	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
2428: Ely	Good	Good	Good	Good	Good	Fair	Very poor	Good	Good	Poor
Colo, overwash	Good	Fair	Good	Fair	Poor	Fair	Fair	Fair	Fair	Good
Mt. Sterling	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
4946C. Udorthents-Interstate highway										
5030. Pits, limestone quarry										
5040. Udorthents, loamy										
5080. Udorthents, sanitary landfill										
AW. Animal waste lagoon										
SL. Sewage lagoon										
W. Water										
Y8B: Judson	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Y8C: Judson	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Y24C2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Y24D2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Y24D3:										
Shelby, severely eroded	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Y24E:										
Shelby	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Y24E2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Y24E3:										
Shelby, severely eroded	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Y24F2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Y24F3:										
Shelby, severely eroded	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Y82C3:										
Adair, severely eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Shelby, severely eroded	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Y93D2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Adair, moderately eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Y93D3:										
Shelby, severely eroded	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Adair, severely eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Y93E2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Adair, moderately eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Y192C2:										
Adair, moderately eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Y192D2:										
Adair, moderately eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Y222C2:										
Clarinda, moderately eroded	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor
Y222D2:										
Clarinda, moderately eroded	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor
Y222D3:										
Clarinda, severely eroded	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor
Z8B:										
Judson	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Z8C:										
Judson	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Z24D2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Z24D3:										
Shelby, severely eroded	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Z24E2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Z24E3:										
Shelby, severely eroded	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Z24F2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Z82D3:										
Adair, severely eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Shelby, severely eroded	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Z93C2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Adair, moderately eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Z93D2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Adair, moderately eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Z93E2:										
Shelby, moderately eroded	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Adair, moderately eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Z192C3:										
Adair, severely eroded	Fair	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor
Z222D2:										
Clarinda, moderately eroded	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading “Soil Properties.”

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, reclamation material, roadfill, and topsoil; plan structures for water management; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary, which is in Part I of this publication.

Building Site Development

The titles of the tables described in this section are:

- “Dwellings and Small Commercial Buildings”
- “Roads and Streets, Shallow Excavations, and Lawns and Landscaping”

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. The tables described in this section show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Dwellings and Small Commercial Buildings

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7:							
Wiota, rarely flooded	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to saturated zone	0.61		
7B:							
Wiota, rarely flooded	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to saturated zone	0.61		
9:							
Marshall	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
9B:							
Marshall	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
9C2:							
Marshall, moderately eroded	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
9C3:							
Marshall, severely eroded	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
9D2:							
Marshall, moderately eroded	70	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
15B:							
Olmitz	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to saturated zone	0.61		
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15B:							
Zook	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
16:							
Nodaway, occasionally flooded	55	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.61		
Kennebec, occasionally flooded	35	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.61		
43:							
Bremer, rarely flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
54:							
Zook, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
54+:							
Zook, occasionally flooded, overwash	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
88:							
Nevin, rarely flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
99D2:							
Exira, moderately eroded	65	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99D3:							
Exira, severely eroded	75	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
99E2:							
Exira, moderately eroded	75	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
99E3:							
Exira, severely eroded	80	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
113B:							
Colo, frequently flooded, overwash	50	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Ely	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
136:							
Ankeny, occasionally flooded	95	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
212:							
Kennebec, occasionally flooded	70	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.61		
220:							
Nodaway, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.61		

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
229C2:							
Clarinda, moderately eroded	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	0.88
Clarinda, severely eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	0.88
229D2:							
Clarinda, moderately eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	1.00
Clarinda, severely eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	1.00
247D2:							
Shelby, sandy substratum, moderately eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
Hesch, deep, moderately eroded	25	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
Hesch, moderately eroded	20	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
				Depth to soft bedrock	0.64		
269:							
Humeston, occasionally flooded, occasionally ponded	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Shrink-swell	1.00	Ponding	1.00
		Shrink-swell	0.50	Ponding	1.00	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
273B:							
Olmitz--------------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to saturated zone	0.61		
289D2:							
Dickman, loamy substratum, moderately eroded--	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
Marshall, moderately eroded--	30	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
300:							
Bremer, terrace-----	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
337D2:							
Dickman, loamy substratum, moderately eroded--	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
Sharpsburg, moderately eroded--	40	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
				Depth to saturated zone	0.61		
370:							
Sharpsburg----------	95	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.61		
370B:							
Sharpsburg----------	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.61		
371C2:							
Sharpsburg, moderately eroded--	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
				Depth to saturated zone	0.61	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
371C2:							
Nira, moderately eroded	30	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Depth to saturated zone	1.00	Slope	0.88
		Depth to saturated zone	0.39	Shrink-swell	0.50	Shrink-swell	0.50
						Depth to saturated zone	0.39
371D2:							
Sharpsburg	45	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	1.00
				Depth to saturated zone	0.61		
Sharpsburg, moderately eroded	20	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
				Depth to saturated zone	0.61		
Nira, moderately eroded	20	Somewhat limited		Very limited		Very limited	
		Shrink-swell	0.50	Depth to saturated zone	1.00	Slope	1.00
		Slope	0.63	Shrink-swell	0.50	Shrink-swell	0.50
		Depth to saturated zone	0.39	Slope	0.63	Depth to saturated zone	0.39
371E2:							
Sharpsburg, moderately eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to saturated zone	0.61		
Nira, moderately eroded	10	Very limited		Very limited		Very limited	
		Too steep	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	0.50	Too steep	1.00	Shrink-swell	0.50
		Depth to saturated zone	0.39	Shrink-swell	0.50	Depth to saturated zone	0.39
430:							
Ackmore, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	1.00	Shrink-swell	0.50
431B:							
Judson	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
431B:							
Ackmore, rarely flooded	25	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	1.00	Shrink-swell	0.50
Colo, frequently flooded, overwash	15	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
435:							
Zook, occasionally flooded	40	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Mt. Sterling, occasionally flooded	35	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	1.00	Shrink-swell	0.50
469C2:							
Lamoni, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
Clarinda, moderately eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	0.88
Shelby, moderately eroded	20	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
469C3:							
Lamoni, severely eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
469C3:							
Clarinda, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	0.88
Shelby, severely eroded	20	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
470D2:							
Lamoni, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
Shelby, moderately eroded	25	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
509B:							
Marshall, terrace	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
509C:							
Marshall, terrace	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
509C2:							
Marshall, terrace, moderately eroded	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
545B:							
Zook	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Gullied land	20	Not rated		Not rated		Not rated	

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
733:							
Calco, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
803:							
Melia, terrace	90	Not limited		Not limited		Not limited	
824E3:							
Shelby, severely eroded	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Lamoni, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Too steep	1.00	Too steep	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
870B:							
Sharpsburg, terrace	85	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	0.50	Shrink-swell	1.00
				Depth to saturated zone	0.61		
1239:							
Corley, terrace	60	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	1.00	Shrink-swell	0.50
Minden, terrace	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
2428:							
Ely	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Colo, overwash	25	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Mt. Sterling	20	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	1.00	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4946C:							
Udorthents	65	Not rated		Not rated		Not rated	
Interstate highway	30	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarry	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy	100	Not rated		Not rated		Not rated	
5080:							
Udorthents, sanitary landfill	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	
Y8B:							
Judson	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Y8C:							
Judson	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
Y24C2:							
Shelby, moderately eroded	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
Y24D2:							
Shelby, moderately eroded	65	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
Y24D3:							
Shelby, severely eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
Y24E:							
Shelby	60	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y24E2:							
Shelby, moderately eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Y24E3:							
Shelby, severely eroded	65	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Y24F2:							
Shelby, moderately eroded	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Y24F3:							
Shelby, severely eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Y82C3:							
Adair, severely eroded	60	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	0.50	Shrink-swell	1.00
						Slope	0.88
Shelby, severely eroded	25	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
Y93D2:							
Shelby, moderately eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
Adair, moderately eroded	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	0.73	Shrink-swell	0.73	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.73
Y93D3:							
Shelby, severely eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y93D3:							
Adair, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	1.00	Shrink-swell	0.50	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	1.00
Y93E2:							
Shelby, moderately eroded	40	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Adair, moderately eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Too steep	1.00	Too steep	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.73	Shrink-swell	0.73	Shrink-swell	0.73
Y192C2:							
Adair, moderately eroded	65	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.92	Shrink-swell	0.92	Shrink-swell	0.92
						Slope	0.88
Y192D2:							
Adair, moderately eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	0.73	Shrink-swell	0.73	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.73
Y222C2:							
Clarinda, moderately eroded	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	0.88
Y222D2:							
Clarinda, moderately eroded	60	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	1.00
Y222D3:							
Clarinda, severely eroded	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	1.00

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z8B:							
Judson	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Z8C:							
Judson	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
Z24D2:							
Shelby, moderately eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
Z24D3:							
Shelby, severely eroded	85	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
Z24E2:							
Shelby, moderately eroded	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Z24E3:							
Shelby, severely eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Z24F2:							
Shelby, moderately eroded	60	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Z82D3:							
Adair, severely eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	1.00	Shrink-swell	0.50	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	1.00
Shelby, severely eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
Z93C2:							
Shelby, moderately eroded	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z93C2:							
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.73	Shrink-swell	0.73	Slope	0.88
						Shrink-swell	0.73
Z93D2:							
Shelby, moderately eroded	65	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.50
Adair, moderately eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	0.73	Shrink-swell	0.73	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	0.73
Z93E2:							
Shelby, moderately eroded	45	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Too steep	1.00	Too steep	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.73	Shrink-swell	0.73	Shrink-swell	0.73
Z192C3:							
Adair, severely eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	0.50	Shrink-swell	1.00
						Slope	0.88
Z222D2:							
Clarinda, moderately eroded	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	1.00

Roads and Streets, Shallow Excavations, and Lawns and Landscaping

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7:							
Wiota, rarely flooded	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Depth to saturated zone	0.61		
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Flooding	0.40				
7B:							
Wiota, rarely flooded	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Depth to saturated zone	0.61		
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Flooding	0.40				
9:							
Marshall	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
9B:							
Marshall	100	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
9C2:							
Marshall, moderately eroded	80	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
9C3:							
Marshall, severely eroded	80	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
9D2:							
Marshall, moderately eroded	70	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Slope	0.63				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15B:							
Olmitz	35	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Depth to saturated zone	0.61		
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Frost action	0.50				
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
Zook	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.01		
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
16:							
Nodaway, occasionally flooded	55	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	0.61	Flooding	0.60
		Flooding	1.00	Flooding	0.60		
		Low strength	1.00	Unstable excavation walls	0.10		
Kennebec, occasionally flooded	35	Very limited		Somewhat limited		Very limited	
		Frost action	1.00	Depth to saturated zone	0.61	Too dense	1.00
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Low strength	1.00	Unstable excavation walls	0.10		
43:							
Bremer, rarely flooded	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Unstable excavation walls	0.10		
		Frost action	1.00				
		Low strength	1.00				
		Flooding	0.40				
54:							
Zook, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Flooding	0.60	Flooding	0.60
		Frost action	1.00	Too clayey	0.01		
		Flooding	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
54+:							
Zook, occasionally flooded, overwash--	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Flooding	0.60	Flooding	0.60
		Frost action	1.00	Unstable excavation walls	0.10		
		Flooding	1.00				
		Low strength	1.00				
88:							
Nevin, rarely flooded------------	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
		Flooding	0.40				
99D2:							
Exira, moderately eroded-------------	65	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Slope	0.63				
99D3:							
Exira, severely eroded-------------	75	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Slope	0.63				
99E2:							
Exira, moderately eroded-------------	75	Very limited		Very limited		Very limited	
		Frost action	1.00	Too steep	1.00	Too steep	1.00
		Low strength	1.00	Unstable excavation walls	0.10		
		Too steep	1.00				
		Shrink-swell	0.50				
99E3:							
Exira, severely eroded-------------	80	Very limited		Very limited		Very limited	
		Frost action	1.00	Too steep	1.00	Too steep	1.00
		Low strength	1.00	Unstable excavation walls	0.10		
		Too steep	1.00				
		Shrink-swell	0.50				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
113B:							
Colo, frequently flooded, overwash	50	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Frost action	1.00	Flooding	0.80	Depth to saturated zone	1.00
		Flooding	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
Ely	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
136:							
Ankeny, occasionally flooded	95	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Unstable excavation walls	1.00	Flooding	0.60
		Frost action	0.50	Flooding	0.60		
212:							
Kennebec, occasionally flooded	70	Very limited		Somewhat limited		Very limited	
		Frost action	1.00	Depth to saturated zone	0.61	Too dense	1.00
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Low strength	1.00	Unstable excavation walls	0.10		
220:							
Nodaway, occasionally flooded	75	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	0.61	Flooding	0.60
		Flooding	1.00	Flooding	0.60		
		Low strength	1.00	Unstable excavation walls	0.10		
229C2:							
Clarinda, moderately eroded	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.50		
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
229C2:							
Clarinda, severely eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.50	Too clayey	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
229D2:							
Clarinda, moderately eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.50	Slope	0.63
		Frost action	1.00	Slope	0.63		
		Low strength	1.00	Unstable excavation walls	0.10		
		Slope	0.63				
Clarinda, severely eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.50	Too clayey	1.00
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Unstable excavation walls	0.10		
		Slope	0.63				
247D2:							
Shelby, sandy substratum, moderately eroded	35	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
		Frost action	0.50				
Hesch, deep, moderately eroded	25	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.63	Unstable excavation walls	1.00	Slope	0.63
		Frost action	0.50	Slope	0.63		
Hesch, moderately eroded	20	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.63	Unstable excavation walls	1.00	Slope	0.63
		Frost action	0.50	Slope	0.63		
				Depth to soft bedrock	0.64		

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
269:							
Humeston, occasionally flooded, occasionally ponded	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Ponding	1.00	Ponding	1.00
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Low strength	1.00	Unstable excavation walls	0.10		
		Ponding	1.00				
273B:							
Olmitz	80	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Depth to saturated zone	0.61		
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Frost action	0.50				
289D2:							
Dickman, loamy substratum, moderately eroded	35	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.63	Unstable excavation walls	1.00	Slope	0.63
				Slope	0.63		
Marshall, moderately eroded	30	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Slope	0.63				
300:							
Bremer, terrace	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Unstable excavation walls	0.10		
		Frost action	1.00				
		Low strength	1.00				
337D2:							
Dickman, loamy substratum, moderately eroded	45	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.63	Unstable excavation walls	1.00	Slope	0.63
				Slope	0.63		
Sharpsburg, moderately eroded	40	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Depth to saturated zone	0.61		
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
370:							
Sharpsburg----------	95	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Depth to saturated zone	0.61		
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
370B:							
Sharpsburg----------	80	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Depth to saturated zone	0.61		
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
371C2:							
Sharpsburg, moderately eroded--	65	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Depth to saturated zone	0.61		
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
Nira, moderately eroded-------------	30	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Depth to saturated zone	0.19				
371D2:							
Sharpsburg----------	45	Very limited		Somewhat limited		Somewhat limited	
		Shrink-swell	1.00	Slope	0.63	Slope	0.63
		Frost action	1.00	Depth to saturated zone	0.61		
		Low strength	1.00	Unstable excavation walls	0.10		
		Slope	0.63				
Sharpsburg, moderately eroded--	20	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Depth to saturated zone	0.61		
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
Nira, moderately eroded-------------	20	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Slope	0.63
		Low strength	1.00	Slope	0.63	Depth to saturated zone	0.19
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
		Depth to saturated zone	0.19				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
371E2:							
Sharpsburg, moderately eroded--	55	Very limited		Very limited		Very limited	
		Frost action	1.00	Too steep	1.00	Too steep	1.00
		Low strength	1.00	Depth to saturated zone	0.61		
		Too steep	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
Nira, moderately eroded-------------	10	Very limited		Very limited		Very limited	
		Frost action	1.00	Depth to saturated zone	1.00	Too steep	1.00
		Low strength	1.00	Too steep	1.00	Depth to saturated zone	0.19
		Too steep	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Depth to saturated zone	0.19				
430:							
Ackmore, occasionally flooded------------	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
431B:							
Judson--------------	50	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
Ackmore, rarely flooded------------	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
		Flooding	0.40				
Colo, frequently flooded, overwash--	15	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Frost action	1.00	Flooding	0.80	Depth to saturated zone	1.00
		Flooding	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
435:							
Zook, occasionally flooded	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Flooding	0.60	Flooding	0.60
		Frost action	1.00	Too clayey	0.01		
		Flooding	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
Mt. Sterling, occasionally flooded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Too clayey	0.01		
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
469C2:							
Lamoni, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Low strength	1.00	Too clayey	0.28		
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Frost action	0.50				
Clarinda, moderately eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.50		
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
Shelby, moderately eroded	20	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
469C3:							
Lamoni, severely eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Clarinda, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.50	Too clayey	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
469C3:							
Shelby, severely eroded	20	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
470D2:							
Lamoni, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Low strength	1.00	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Too clayey	0.28		
		Slope	0.63	Unstable excavation walls	0.10		
		Frost action	0.50				
Shelby, moderately eroded	25	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
		Frost action	0.50				
509B:							
Marshall, terrace	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
509C:							
Marshall, terrace	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
509C2:							
Marshall, terrace, moderately eroded	95	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
545B:							
Zook	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.01		
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
Gullied land	20	Not rated		Not rated		Not rated	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
733:							
Calco, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
803:							
Melia, terrace	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
824E3:							
Shelby, severely eroded	50	Very limited		Very limited		Very limited	
		Low strength	1.00	Too steep	1.00	Too steep	1.00
		Too steep	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Lamoni, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Low strength	1.00	Too steep	1.00	Too steep	1.00
		Too steep	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
870B:							
Sharpsburg, terrace	85	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Depth to saturated zone	0.61		
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
1239:							
Corley, terrace	60	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
Minden, terrace	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2428:							
Ely	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
Colo, overwash	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Frost action	1.00	Flooding	0.80	Depth to saturated zone	1.00
		Flooding	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
Mt. Sterling	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.80	Flooding	1.00
		Flooding	1.00	Unstable excavation walls	0.10		
		Low strength	1.00	Too clayey	0.01		
		Shrink-swell	0.50				
4946C:							
Udorthents	65	Not rated		Not rated		Not rated	
Interstate highway	30	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarry	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy	100	Not rated		Not rated		Not rated	
5080:							
Udorthents, sanitary landfill	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	
Y8B:							
Judson	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
Y8C:							
Judson	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y24C2:							
Shelby, moderately eroded	60	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Y24D2:							
Shelby, moderately eroded	65	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
		Frost action	0.50				
Y24D3:							
Shelby, severely eroded	55	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
		Frost action	0.50				
Y24E:							
Shelby	60	Very limited		Very limited		Very limited	
		Low strength	1.00	Too steep	1.00	Too steep	1.00
		Too steep	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Y24E2:							
Shelby, moderately eroded	55	Very limited		Very limited		Very limited	
		Low strength	1.00	Too steep	1.00	Too steep	1.00
		Too steep	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Y24E3:							
Shelby, severely eroded	65	Very limited		Very limited		Very limited	
		Low strength	1.00	Too steep	1.00	Too steep	1.00
		Too steep	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Y24F2:							
Shelby, moderately eroded	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y24F3:							
Shelby, severely eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Y82C3:							
Adair, severely eroded	60	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.40		
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
Shelby, severely eroded	25	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Y93D2:							
Shelby, moderately eroded	35	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
		Frost action	0.50				
Adair, moderately eroded	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.73				
		Slope	0.63				
Y93D3:							
Shelby, severely eroded	35	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
		Frost action	0.50				
Adair, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.40	Slope	0.63
		Frost action	1.00	Slope	0.63		
		Low strength	1.00	Unstable excavation walls	0.10		
		Slope	0.63				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y93E2:							
Shelby, moderately eroded	40	Very limited		Very limited		Very limited	
		Low strength	1.00	Too steep	1.00	Too steep	1.00
		Too steep	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Adair, moderately eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Too steep	1.00	Too steep	1.00
		Low strength	1.00	Unstable excavation walls	0.10		
		Too steep	1.00				
		Shrink-swell	0.73				
Y192C2:							
Adair, moderately eroded	65	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.92				
Y192D2:							
Adair, moderately eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.73				
		Slope	0.63				
Y222C2:							
Clarinda, moderately eroded	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.50		
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
Y222D2:							
Clarinda, moderately eroded	60	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.50	Slope	0.63
		Frost action	1.00	Slope	0.63		
		Low strength	1.00	Unstable excavation walls	0.10		
		Slope	0.63				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y222D3:							
Clarinda, severely eroded	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.50	Too clayey	1.00
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Unstable excavation walls	0.10		
		Slope	0.63				
Z8B:							
Judson	80	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
Z8C:							
Judson	75	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
Z24D2:							
Shelby, moderately eroded	55	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
		Frost action	0.50				
Z24D3:							
Shelby, severely eroded	85	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
		Frost action	0.50				
Z24E2:							
Shelby, moderately eroded	50	Very limited		Very limited		Very limited	
		Low strength	1.00	Too steep	1.00	Too steep	1.00
		Too steep	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Z24E3:							
Shelby, severely eroded	55	Very limited		Very limited		Very limited	
		Low strength	1.00	Too steep	1.00	Too steep	1.00
		Too steep	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z24F2:							
Shelby, moderately eroded	60	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Z82D3:							
Adair, severely eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.40	Slope	0.63
		Frost action	1.00	Slope	0.63		
		Low strength	1.00	Unstable excavation walls	0.10		
		Slope	0.63				
Shelby, severely eroded	30	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
		Frost action	0.50				
Z93C2:							
Shelby, moderately eroded	40	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
		Shrink-swell	0.73				
Z93D2:							
Shelby, moderately eroded	65	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Slope	0.63				
		Frost action	0.50				
Adair, moderately eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.73				
		Slope	0.63				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z93E2:							
Shelby, moderately eroded	45	Very limited		Very limited		Very limited	
		Low strength	1.00	Too steep	1.00	Too steep	1.00
		Too steep	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Too steep	1.00	Too steep	1.00
		Low strength	1.00	Unstable excavation walls	0.10		
		Too steep	1.00				
		Shrink-swell	0.73				
Z192C3:							
Adair, severely eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.40		
		Frost action	1.00	Unstable excavation walls	0.10		
		Low strength	1.00				
Z222D2:							
Clarinda, moderately eroded	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.50	Slope	0.63
		Frost action	1.00	Slope	0.63		
		Low strength	1.00	Unstable excavation walls	0.10		
		Slope	0.63				

Sanitary Facilities

The titles of the tables described in this section are:

- “Sewage Disposal”
- “Landfills”

These tables show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Sewage Disposal

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
7:					
Wiota, rarely flooded	85	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Slow water movement	1.00	Flooding	0.40
		Flooding	0.40		
7B:					
Wiota, rarely flooded	85	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Slow water movement	1.00	Slope	0.32
				Flooding	0.40
		Flooding	0.40		
9:					
Marshall	90	Very limited		Not limited	
		Slow water movement	1.00		
9B:					
Marshall	100	Very limited		Somewhat limited	
		Slow water movement	1.00	Slope	0.32
9C2:					
Marshall, moderately eroded	80	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
9C3:					
Marshall, severely eroded	80	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
9D2:					
Marshall, moderately eroded	70	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
15B:					
Olmitz	35	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Slow water movement	0.95	Slope	0.32
				Seepage	0.05
Ely	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	0.32
				Seepage	0.05
Zook	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	0.32
16:					
Nodaway, occasionally flooded	55	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Slow water movement	0.95	Seepage	0.05
Kennebec, occasionally flooded	35	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Slow water movement	0.50	Seepage	0.50
43:					
Bremer, rarely flooded	80	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Flooding	0.40
		Flooding	0.40		
54:					
Zook, occasionally flooded	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00		

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
54+:					
Zook, occasionally flooded, overwash	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.05
88:					
Nevin, rarely flooded	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Flooding	0.40
		Flooding	0.40		
99D2:					
Exira, moderately eroded	65	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63	Seepage	0.50
99D3:					
Exira, severely eroded	75	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63	Seepage	0.50
99E2:					
Exira, moderately eroded	75	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00	Seepage	0.50
99E3:					
Exira, severely eroded	80	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00	Seepage	0.50
113B:					
Colo, frequently flooded, overwash	50	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.50
				Slope	0.08
Ely	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	0.08
				Seepage	0.05

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
136:					
Ankeny, occasionally flooded	95	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
212:					
Kennebec, occasionally flooded	70	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Slow water movement	0.50	Seepage	0.50
220:					
Nodaway, occasionally flooded	75	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Slow water movement	0.95	Seepage	0.05
229C2:					
Clarinda, moderately eroded	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	1.00
Clarinda, severely eroded	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	1.00
229D2:					
Clarinda, moderately eroded	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63		
Clarinda, severely eroded	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63		

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields Rating class and limiting features	Value	Sewage lagoons Rating class and limiting features	Value
247D2:					
Shelby, sandy substratum, moderately eroded	35	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slope	0.63		
Hesch, deep, moderately eroded	25	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	0.63	Seepage	1.00
				Depth to soft bedrock	0.54
Hesch, moderately eroded	20	Very limited		Very limited	
		Filtering capacity	1.00	Depth to soft bedrock	1.00
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	0.63	Seepage	1.00
269:					
Humeston, occasionally flooded, occasionally ponded	100	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Seepage	0.50
273B:					
Olmitz	80	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Slow water movement	1.00	Slope	0.32
289D2:					
Dickman, loamy substratum, moderately eroded	35	Somewhat limited		Very limited	
		Slow water movement	0.92	Slope	1.00
		Slope	0.63	Seepage	1.00
Marshall, moderately eroded	30	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
300:					
Bremer, terrace-----	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00		
337D2:					
Dickman, loamy substratum, moderately eroded--	45	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63	Seepage	1.00
Sharpsburg, moderately eroded--	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	0.71
		Slope	0.63		
370:					
Sharpsburg----------	95	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Slow water movement	1.00		
370B:					
Sharpsburg----------	80	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Slow water movement	1.00	Slope	0.32
371C2:					
Sharpsburg, moderately eroded--	65	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	0.71
Nira, moderately eroded-------------	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.95	Slope	1.00
				Seepage	0.05
371D2:					
Sharpsburg----------	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	0.71
		Slope	0.63		

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
371D2:					
Sharpsburg, moderately eroded	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	0.71
		Slope	0.63		
Nira, moderately eroded	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	0.95	Depth to saturated zone	1.00
		Slope	0.63	Seepage	0.05
371E2:					
Sharpsburg, moderately eroded	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Too steep	1.00	Depth to saturated zone	0.71
		Slow water movement	1.00		
Nira, moderately eroded	10	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Too steep	1.00	Depth to saturated zone	1.00
		Slow water movement	0.95	Seepage	0.05
430:					
Ackmore, occasionally flooded	75	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.50
431B:					
Judson	50	Very limited		Somewhat limited	
		Slow water movement	1.00	Slope	0.32
Ackmore, rarely flooded	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.50
		Flooding	0.40	Flooding	0.40

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
431B:					
Colo, frequently flooded, overwash	15	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.50
435:					
Zook, occasionally flooded	40	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00		
Mt. Sterling, occasionally flooded	35	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.50
469C2:					
Lamoni, moderately eroded	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	1.00
Clarinda, moderately eroded	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	1.00
Shelby, moderately eroded	20	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
469C3:					
Lamoni, severely eroded	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	1.00

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
469C3:					
Clarinda, severely eroded	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	1.00
Shelby, severely eroded	20	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
470D2:					
Lamoni, moderately eroded	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63		
Shelby, moderately eroded	25	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		
509B:					
Marshall, terrace	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Slope	0.32
509C:					
Marshall, terrace	90	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
509C2:					
Marshall, terrace, moderately eroded	95	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
545B:					
Zook	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	0.32
Ely	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	0.32
				Seepage	0.05
Gullied land	20	Not rated		Not rated	

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
733:					
Calco, occasionally flooded	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00		
803:					
Melia, terrace	90	Very limited		Not limited	
		Slow water movement	1.00		
824E3:					
Shelby, severely eroded	50	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00		
Lamoni, severely eroded	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Too steep	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00		
870B:					
Sharpsburg, terrace	85	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Slow water movement	1.00	Slope	0.08
1239:					
Corley, terrace	60	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.50
Minden, terrace	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00		
2428:					
Ely	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.05

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
2428:					
Colo, overwash	25	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.50
Mt. Sterling	20	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.50
4946C:					
Udorthents	65	Not rated		Not rated	
Interstate highway	30	Not rated		Not rated	
5030:					
Pits, limestone quarry	100	Not rated		Not rated	
5040:					
Udorthents, loamy	100	Not rated		Not rated	
5080:					
Udorthents, sanitary landfill	100	Not rated		Not rated	
AW:					
Animal waste lagoon	100	Not rated		Not rated	
SL:					
Sewage lagoon	100	Not rated		Not rated	
W:					
Water	100	Not rated		Not rated	
Y8B:					
Judson	85	Very limited		Somewhat limited	
		Slow water movement	1.00	Slope	0.32
Y8C:					
Judson	85	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
Y24C2:					
Shelby, moderately eroded	60	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
Y24D2:					
Shelby, moderately eroded	65	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		
Y24D3:					
Shelby, severely eroded	55	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		
Y24E:					
Shelby	60	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00		
Y24E2:					
Shelby, moderately eroded	55	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00		
Y24E3:					
Shelby, severely eroded	65	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00		
Y24F2:					
Shelby, moderately eroded	50	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00		
Y24F3:					
Shelby, severely eroded	55	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00		
Y82C3:					
Adair, severely eroded	60	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	1.00
Shelby, severely eroded	25	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
Y93D2:					
Shelby, moderately eroded	35	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		
Adair, moderately eroded	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63		
Y93D3:					
Shelby, severely eroded	35	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		
Adair, severely eroded	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63		
Y93E2:					
Shelby, moderately eroded	40	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00		
Adair, moderately eroded	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Too steep	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00		
Y192C2:					
Adair, moderately eroded	65	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	1.00

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
Y192D2:					
Adair, moderately eroded	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63		
Y222C2:					
Clarinda, moderately eroded	75	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	1.00
Y222D2:					
Clarinda, moderately eroded	60	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63		
Y222D3:					
Clarinda, severely eroded	70	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63		
Z8B:					
Judson	80	Very limited		Somewhat limited	
		Slow water movement	1.00	Slope	0.32
Z8C:					
Judson	75	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
Z24D2:					
Shelby, moderately eroded	55	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		
Z24D3:					
Shelby, severely eroded	85	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
Z24E2:					
Shelby, moderately eroded	50	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00		
Z24E3:					
Shelby, severely eroded	55	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00		
Z24F2:					
Shelby, moderately eroded	60	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00		
Z82D3:					
Adair, severely eroded	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63		
Shelby, severely eroded	30	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		
Z93C2:					
Shelby, moderately eroded	40	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
Adair, moderately eroded	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	1.00
Z93D2:					
Shelby, moderately eroded	65	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
Z93D2:					
Adair, moderately eroded-------------	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63		
Z93E2:					
Shelby, moderately eroded-------------	45	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Slow water movement	1.00		
Adair, moderately eroded-------------	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Too steep	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00		
Z192C3:					
Adair, severely eroded-------------	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Slope	1.00
Z222D2:					
Clarinda, moderately eroded--	70	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.63		

Landfills

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7:							
Wiota, rarely flooded	85	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50	Flooding	0.40		
		Flooding	0.40				
7B:							
Wiota, rarely flooded	85	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50	Flooding	0.40		
		Flooding	0.40				
9:							
Marshall	90	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
9B:							
Marshall	100	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
9C2:							
Marshall, moderately eroded	80	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
9C3:							
Marshall, severely eroded	80	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
9D2:							
Marshall, moderately eroded	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
15B:							
Olmitz	35	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15B:							
Zook	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
16:							
Nodaway, occasionally flooded	55	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Too clayey	0.50				
Kennebec, occasionally flooded	35	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
43:							
Bremer, rarely flooded	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50	Flooding	0.40	Hard to compact	1.00
		Flooding	0.40			Too clayey	0.50
54:							
Zook, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50
54+:							
Zook, occasionally flooded, overwash	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50
88:							
Nevin, rarely flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50	Flooding	0.40	Too clayey	0.50
		Flooding	0.40				
99D2:							
Exira, moderately eroded	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
						Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
99D3:							
Exira, severely eroded	75	Somewhat limited Slope	 0.63	Somewhat limited Slope	 0.63	Somewhat limited Slope Too clayey	 0.63 0.50
99E2:							
Exira, moderately eroded	75	Very limited Too steep	 1.00	Very limited Too steep	 1.00	Very limited Too steep Too clayey	 1.00 0.50
99E3:							
Exira, severely eroded	80	Very limited Too steep	 1.00	Very limited Too steep	 1.00	Very limited Too steep Too clayey	 1.00 0.50
113B:							
Colo, frequently flooded, overwash	50	Very limited Flooding Depth to saturated zone Too clayey	 1.00 1.00 0.50	Very limited Flooding Depth to saturated zone	 1.00 1.00	Very limited Depth to saturated zone Too clayey	 1.00 0.50
Ely	25	Very limited Depth to saturated zone Too clayey	 1.00 0.50	Very limited Depth to saturated zone	 1.00	Very limited Depth to saturated zone Too clayey	 1.00 0.50
136:							
Ankeny, occasionally flooded	95	Very limited Flooding Seepage, bottom layer	 1.00 1.00	Very limited Flooding Seepage	 1.00 1.00	Somewhat limited Seepage	 0.31
212:							
Kennebec, occasionally flooded	70	Very limited Flooding Depth to saturated zone	 1.00 1.00	Very limited Flooding Depth to saturated zone	 1.00 1.00	Not limited	
220:							
Nodaway, occasionally flooded	75	Very limited Flooding Depth to saturated zone Too clayey	 1.00 1.00 0.50	Very limited Flooding Depth to saturated zone	 1.00 1.00	Somewhat limited Too clayey	 0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
229C2:							
Clarinda, moderately eroded	40	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Too clayey	1.00
						Hard to compact	1.00
Clarinda, severely eroded	20	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Too clayey	1.00
						Hard to compact	1.00
229D2:							
Clarinda, moderately eroded	55	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slope	0.63	Hard to compact	1.00
		Slope	0.63			Slope	0.63
Clarinda, severely eroded	20	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slope	0.63	Too clayey	1.00
		Slope	0.63			Hard to compact	1.00
						Slope	0.63
247D2:							
Shelby, sandy substratum, moderately eroded	35	Very limited		Somewhat limited		Somewhat limited	
		Seepage, bottom layer	1.00	Slope	0.63	Seepage	0.50
		Slope	0.63			Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Hesch, deep, moderately eroded	25	Very limited		Very limited		Somewhat limited	
		Seepage, bottom layer	1.00	Seepage	1.00	Seepage	0.50
		Slope	0.63	Slope	0.63	Slope	0.63
Hesch, moderately eroded	20	Very limited		Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00	Seepage	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
		Too sandy	0.50			Too sandy	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
269:							
Humeston, occasionally flooded, occasionally ponded	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Ponding	1.00	Too clayey	0.50
		Too clayey	0.50				
273B:							
Olmitz	80	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
289D2:							
Dickman, loamy substratum, moderately eroded	35	Somewhat limited		Very limited		Very limited	
		Slope	0.63	Seepage	1.00	Seepage	1.00
		Too sandy	0.50	Slope	0.63	Slope	0.63
						Too sandy	0.50
Marshall, moderately eroded	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
300:							
Bremer, terrace	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
337D2:							
Dickman, loamy substratum, moderately eroded	45	Somewhat limited		Very limited		Very limited	
		Slope	0.63	Seepage	1.00	Seepage	1.00
		Too sandy	0.50	Slope	0.63	Slope	0.63
						Too sandy	0.50
Sharpsburg, moderately eroded	40	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	0.63
		Slope	0.63	Slope	0.63	Too clayey	0.50
		Too clayey	0.50				
370:							
Sharpsburg	95	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
370B:							
Sharpsburg	80	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
371C2:							
Sharpsburg, moderately eroded	65	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
Nira, moderately eroded	30	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.86
		Too clayey	0.50			Too clayey	0.50
371D2:							
Sharpsburg	45	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	0.63
		Slope	0.63	Slope	0.63	Too clayey	0.50
		Too clayey	0.50				
Sharpsburg, moderately eroded	20	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	0.63
		Slope	0.63	Slope	0.63	Too clayey	0.50
		Too clayey	0.50				
Nira, moderately eroded	20	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	0.63
		Slope	0.63	Slope	0.63	Depth to saturated zone	0.86
		Too clayey	0.50			Too clayey	0.50
371E2:							
Sharpsburg, moderately eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too steep	1.00
		Too steep	1.00	Too steep	1.00	Too clayey	0.50
		Too clayey	0.50				
Nira, moderately eroded	10	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too steep	1.00
		Too steep	1.00	Too steep	1.00	Depth to saturated zone	0.86
		Too clayey	0.50			Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
430:							
Ackmore, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
431B:							
Judson	50	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Ackmore, rarely flooded	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50	Flooding	0.40	Too clayey	0.50
		Flooding	0.40				
Colo, frequently flooded, overwash	15	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
435:							
Zook, occasionally flooded	40	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50
Mt. Sterling, occasionally flooded	35	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50
469C2:							
Lamoni, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
Clarinda, moderately eroded	30	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Too clayey	1.00
						Hard to compact	1.00
Shelby, moderately eroded	20	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
469C3:							
Lamoni, severely eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
Clarinda, severely eroded	30	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Too clayey	1.00
						Hard to compact	1.00
Shelby, severely eroded	20	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
470D2:							
Lamoni, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Shelby, moderately eroded	25	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
509B:							
Marshall, terrace	90	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
509C:							
Marshall, terrace	90	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
509C2:							
Marshall, terrace, moderately eroded	95	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
545B:							
Zook	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
Ely	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
Gullied land	20	Not rated		Not rated		Not rated	

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
733:							
Calco, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
803:							
Melia, terrace	90	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
824E3:							
Shelby, severely eroded	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
Lamoni, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
870B:							
Sharpsburg, terrace	85	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
1239:							
Corley, terrace	60	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
Minden, terrace	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
2428:							
Ely	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
Colo, overwash	25	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
Mt. Sterling	20	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4946C:							
Udorthents	65	Not rated		Not rated		Not rated	
Interstate highway	30	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarry	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy	100	Not rated		Not rated		Not rated	
5080:							
Udorthents, sanitary landfill	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	
Y8B:							
Judson	85	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Y8C:							
Judson	85	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Y24C2:							
Shelby, moderately eroded	60	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Y24D2:							
Shelby, moderately eroded	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Y24D3:							
Shelby, severely eroded	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Y24E:							
Shelby	60	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
Y24E2:							
Shelby, moderately eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y24E3:							
Shelby, severely eroded	65	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
Y24F2:							
Shelby, moderately eroded	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
Y24F3:							
Shelby, severely eroded	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
Y82C3:							
Adair, severely eroded	60	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
Shelby, severely eroded	25	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Y93D2:							
Shelby, moderately eroded	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Adair, moderately eroded	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Y93D3:							
Shelby, severely eroded	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Adair, severely eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Y93E2:							
Shelby, moderately eroded	40	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y93E2:							
Adair, moderately eroded	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
Y192C2:							
Adair, moderately eroded	65	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
Y192D2:							
Adair, moderately eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Y222C2:							
Clarinda, moderately eroded	75	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Too clayey	1.00
						Hard to compact	1.00
Y222D2:							
Clarinda, moderately eroded	60	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slope	0.63	Too clayey	1.00
		Slope	0.63			Hard to compact	1.00
						Slope	0.63
Y222D3:							
Clarinda, severely eroded	70	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slope	0.63	Too clayey	1.00
		Slope	0.63			Hard to compact	1.00
						Slope	0.63
Z8B:							
Judson	80	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Z8C:							
Judson	75	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z24D2:							
Shelby, moderately eroded-------------	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Z24D3:							
Shelby, severely eroded-------------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Z24E2:							
Shelby, moderately eroded-------------	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
Z24E3:							
Shelby, severely eroded-------------	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
Z24F2:							
Shelby, moderately eroded-------------	60	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
Z82D3:							
Adair, severely eroded-------------	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Shelby, severely eroded-------------	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Z93C2:							
Shelby, moderately eroded-------------	40	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Adair, moderately eroded-------------	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
Z93D2:							
Shelby, moderately eroded-------------	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z93D2:							
Adair, moderately eroded	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Z93E2:							
Shelby, moderately eroded	45	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Too clayey	0.50			Too clayey	0.50
Z192C3:							
Adair, severely eroded	55	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
Z222D2:							
Clarinda, moderately eroded	70	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slope	0.63	Too clayey	1.00
		Slope	0.63			Hard to compact	1.00
						Slope	0.63

Construction Materials

The titles of the tables described in this section are:

- “Source of Gravel and Sand”
- “Source of Reclamation Material, Roadfill, and Topsoil”

These tables give information about the soils as potential sources of gravel, sand, reclamation material, roadfill, and topsoil. Normal compaction, minor processing, and other standard construction practices are assumed.

Gravel and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table “Source of Gravel and Sand,” only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated as *improbable, possible, probable,* or *very likely* sources of gravel. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of gravel. The number 0.00 indicates an improbable source; 0.01 to 0.39, a possible source; 0.40 to 0.99, a probable source; and 1.00, a very likely source.

The soils are rated *good, fair,* or *poor* as potential sources of sand. A rating of good or fair means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. The larger the number, the greater the likelihood that the layer is a source of sand.

In the table “Source of Reclamation Material, Roadfill, and Topsoil,” the rating class terms are *good, fair,* and *poor*. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of reclamation material, roadfill, and topsoil. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Source of Gravel and Sand

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
7:					
Wiota, rarely flooded	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7B:					
Wiota, rarely flooded	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
9:					
Marshall	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
9B:					
Marshall	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
9C2:					
Marshall, moderately eroded	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
9C3:					
Marshall, severely eroded	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
9D2:					
Marshall, moderately eroded	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
15B:					
Olmitz	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Ely	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
15B:					
Zook	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
16:					
Nodaway, occasionally flooded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Kennebec, occasionally flooded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
43:					
Bremer, rarely flooded	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
54:					
Zook, occasionally flooded	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
54+:					
Zook, occasionally flooded, overwash	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
88:					
Nevin, rarely flooded	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
99D2:					
Exira, moderately eroded	65	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
99D3:					
Exira, severely eroded	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
99E2:					
Exira, moderately eroded	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
99E3:					
Exira, severely eroded	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
113B:					
Colo, frequently flooded, overwash	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Ely	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
136:					
Ankeny, occasionally flooded	95	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.07
212:					
Kennebec, occasionally flooded	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
220:					
Nodaway, occasionally flooded	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
229C2:					
Clarinda, moderately eroded	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Clarinda, severely eroded	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
229D2:					
Clarinda, moderately eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Clarinda, severely eroded	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
247D2:					
Shelby, sandy substratum, moderately eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Hesch, deep, moderately eroded	25	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.03
Hesch, moderately eroded	20	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.04
269:					
Humeston, occasionally flooded, occasionally ponded	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
273B:					
Olmitz	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
289D2:					
Dickman, loamy substratum, moderately eroded	35	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.07
Marshall, moderately eroded	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
300:					
Bremer, terrace	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
337D2:					
Dickman, loamy substratum, moderately eroded	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.07
Sharpsburg, moderately eroded	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
370:					
Sharpsburg	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
370B:					
Sharpsburg	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
371C2:					
Sharpsburg, moderately eroded	65	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Nira, moderately eroded	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
371D2:					
Sharpsburg	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Sharpsburg, moderately eroded	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Nira, moderately eroded	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
371E2:					
Sharpsburg, moderately eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Nira, moderately eroded	10	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
430:					
Ackmore, occasionally flooded	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
431B:					
Judson	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
431B:					
Ackmore, rarely flooded	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Colo, frequently flooded, overwash	15	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
435:					
Zook, occasionally flooded	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Mt. Sterling, occasionally flooded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
469C2:					
Lamoni, moderately eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Clarinda, moderately eroded	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Shelby, moderately eroded	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
469C3:					
Lamoni, severely eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Clarinda, severely eroded	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Shelby, severely eroded	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
470D2:					
Lamoni, moderately eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
470D2:					
Shelby, moderately eroded	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
509B:					
Marshall, terrace	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
509C:					
Marshall, terrace	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
509C2:					
Marshall, terrace, moderately eroded	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
545B:					
Zook	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Ely	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Gullied land	20	Not rated		Not rated	
733:					
Calco, occasionally flooded	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
803:					
Melia, terrace	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
824E3:					
Shelby, severely eroded	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Lamoni, severely eroded	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
870B:					
Sharpsburg, terrace	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
1239:					
Corley, terrace	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Minden, terrace	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2428:					
Ely	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Colo, overwash	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Mt. Sterling	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4946C:					
Udorthents	65	Not rated		Not rated	
Interstate highway	30	Not rated		Not rated	
5030:					
Pits, limestone quarry	100	Not rated		Not rated	
5040:					
Udorthents, loamy	100	Not rated		Not rated	
5080:					
Udorthents, sanitary landfill	100	Not rated		Not rated	
AW:					
Animal waste lagoon	100	Not rated		Not rated	
SL:					
Sewage lagoon	100	Not rated		Not rated	
W:					
Water	100	Not rated		Not rated	
Y8B:					
Judson	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y8C:					
Judson	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
Y24C2:					
Shelby, moderately eroded	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y24D2:					
Shelby, moderately eroded	65	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y24D3:					
Shelby, severely eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y24E:					
Shelby	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y24E2:					
Shelby, moderately eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y24E3:					
Shelby, severely eroded	65	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y24F2:					
Shelby, moderately eroded	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y24F3:					
Shelby, severely eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y82C3:					
Adair, severely eroded	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Shelby, severely eroded	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
Y93D2:					
Shelby, moderately eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Adair, moderately eroded	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y93D3:					
Shelby, severely eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Adair, severely eroded	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y93E2:					
Shelby, moderately eroded	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Adair, moderately eroded	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y192C2:					
Adair, moderately eroded	65	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y192D2:					
Adair, moderately eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y222C2:					
Clarinda, moderately eroded	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Y222D2:					
Clarinda, moderately eroded	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
Y222D3:					
Clarinda, severely eroded	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z8B:					
Judson	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z8C:					
Judson	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z24D2:					
Shelby, moderately eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z24D3:					
Shelby, severely eroded	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z24E2:					
Shelby, moderately eroded	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z24E3:					
Shelby, severely eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z24F2:					
Shelby, moderately eroded	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z82D3:					
Adair, severely eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Shelby, severely eroded	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
Z93C2:					
Shelby, moderately eroded	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Adair, moderately eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z93D2:					
Shelby, moderately eroded	65	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Adair, moderately eroded	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z93E2:					
Shelby, moderately eroded	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Adair, moderately eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z192C3:					
Adair, severely eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Z222D2:					
Clarinda, moderately eroded	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Reclamation Material, Roadfill, and Topsoil

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7:							
Wiota, rarely flooded	85	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Too acid	0.84	Shrink-swell	0.87		
7B:							
Wiota, rarely flooded	85	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Too acid	0.84	Shrink-swell	0.87		
9:							
Marshall	90	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Too acid	0.88	Shrink-swell	0.87		
9B:							
Marshall	100	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Too acid	0.88	Shrink-swell	0.87		
9C2:							
Marshall, moderately eroded	80	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Low content of organic matter	0.92	Shrink-swell	0.87		
		Too acid	0.97				
9C3:							
Marshall, severely eroded	80	Fair		Poor		Good	
		Water erosion	0.68	Low strength	0.00		
		Low content of organic matter	0.60	Shrink-swell	0.87		
		Too acid	0.97				
9D2:							
Marshall, moderately eroded	70	Fair		Poor		Fair	
		Water erosion	0.90	Low strength	0.00	Slope	0.37
		Low content of organic matter	0.92	Shrink-swell	0.87		
		Too acid	0.97				
15B:							
Olmitz	35	Fair		Poor		Good	
		Too acid	0.97	Low strength	0.00		
				Shrink-swell	0.87		

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15B:							
Ely	30	Fair		Poor		Poor	
		Water erosion	0.99	Wetness	0.00	Wetness	0.00
		Too clayey	0.98	Low strength	0.00	Too clayey	0.98
				Shrink-swell	0.87		
Zook	20	Poor		Poor		Poor	
		Too clayey	0.00	Wetness	0.00	Wetness	0.00
		Too acid	0.97	Low strength	0.00	Too clayey	0.00
				Shrink-swell	0.25		
16:							
Nodaway, occasionally flooded	55	Fair		Poor		Good	
		Low content of organic matter	0.12	Low strength	0.00		
		Water erosion	0.68				
Kennebec, occasionally flooded	35	Fair		Poor		Good	
		Water erosion	0.99	Low strength	0.00		
43:							
Bremer, rarely flooded	80	Fair		Poor		Poor	
		Too clayey	0.01	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Too clayey	0.00
				Shrink-swell	0.69		
54:							
Zook, occasionally flooded	90	Poor		Poor		Poor	
		Too clayey	0.00	Wetness	0.00	Wetness	0.00
		Too acid	0.97	Low strength	0.00	Too clayey	0.00
				Shrink-swell	0.25		
54+:							
Zook, occasionally flooded, overwash	80	Fair		Poor		Poor	
		Water erosion	0.90	Wetness	0.00	Wetness	0.00
		Too clayey	0.12	Low strength	0.00	Too clayey	0.12
				Shrink-swell	0.17		
88:							
Nevin, rarely flooded	90	Fair		Poor		Poor	
		Water erosion	0.99	Wetness	0.00	Wetness	0.00
		Too acid	0.84	Low strength	0.00		
				Shrink-swell	0.87		
99D2:							
Exira, moderately eroded	65	Fair		Poor		Fair	
		Low content of organic matter	0.18	Low strength	0.00	Slope	0.37
				Shrink-swell	0.87		
		Water erosion	0.68				
		Too acid	0.88				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99D3:							
Exira, severely eroded	75	Fair		Poor		Fair	
		Low content of organic matter	0.32	Low strength	0.00	Slope	0.37
		Water erosion	0.68	Shrink-swell	0.87		
		Too acid	0.88				
99E2:							
Exira, moderately eroded	75	Fair		Poor		Poor	
		Low content of organic matter	0.18	Low strength	0.00	Slope	0.00
				Shrink-swell	0.87		
		Water erosion	0.68	Slope	0.98		
		Too acid	0.88				
99E3:							
Exira, severely eroded	80	Fair		Poor		Poor	
		Low content of organic matter	0.32	Low strength	0.00	Slope	0.00
				Shrink-swell	0.87		
		Water erosion	0.68	Slope	0.98		
		Too acid	0.88				
113B:							
Colo, frequently flooded, overwash	50	Fair		Poor		Poor	
		Too clayey	0.88	Wetness	0.00	Wetness	0.00
				Low strength	0.00	Too clayey	0.88
				Shrink-swell	0.87		
Ely	25	Fair		Poor		Poor	
		Water erosion	0.99	Wetness	0.00	Wetness	0.00
		Too clayey	0.98	Low strength	0.00	Too clayey	0.98
				Shrink-swell	0.87		
136:							
Ankeny, occasionally flooded	95	Good		Good		Good	
212:							
Kennebec, occasionally flooded	70	Fair		Poor		Good	
		Water erosion	0.99	Low strength	0.00		
220:							
Nodaway, occasionally flooded	75	Fair		Poor		Good	
		Low content of organic matter	0.12	Low strength	0.00		
		Water erosion	0.68				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
229C2:							
Clarinda, moderately eroded--	40	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
				Low strength	0.00		
		Water erosion	0.99				
		Too acid	0.97				
Clarinda, severely eroded-------------	20	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
				Low strength	0.00		
		Too acid	0.97				
229D2:							
Clarinda, moderately eroded--	55	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
				Low strength	0.00	Slope	0.37
		Water erosion	0.99				
		Too acid	0.97				
Clarinda, severely eroded-------------	20	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
				Low strength	0.00	Slope	0.37
		Too acid	0.97				
247D2:							
Shelby, sandy substratum, moderately eroded--	35	Fair		Fair		Fair	
		Water erosion	0.90	Shrink-swell	0.87	Slope	0.37
		Low content of organic matter	0.50			Too clayey	0.44
						Rock fragments	0.96
		Too clayey	0.68			Gravel content	0.96
		Too acid	0.68				
Hesch, deep, moderately eroded--	25	Fair		Good		Fair	
		Low content of organic matter	0.12			Slope	0.37
						Rock fragments	0.96
		Water erosion	0.99			Gravel content	0.96
		Too acid	0.95				
Hesch, moderately eroded-------------	20	Fair		Good		Fair	
		Too sandy	0.01			Too sandy	0.01
		Low content of organic matter	0.12			Slope	0.37
						Rock fragments	0.98
		Droughty	0.33			Gravel content	0.98
		Too acid	0.68				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value	Potential as source of topsoil: Rating class and limiting features	Value
269:							
Humeston, occasionally flooded, occasionally ponded	100	Fair		Poor		Poor	
		Water erosion	0.68	Wetness	0.00	Wetness	0.00
		Too acid	0.97	Low strength	0.00		
				Shrink-swell	0.43		
273B:							
Olmitz	80	Fair		Poor		Good	
		Too acid	0.97	Low strength	0.00		
				Shrink-swell	0.87		
289D2:							
Dickman, loamy substratum, moderately eroded	35	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.12			Slope	0.37
		Too acid	0.84				
Marshall, moderately eroded	30	Fair		Poor		Fair	
		Water erosion	0.90	Low strength	0.00	Slope	0.37
		Low content of organic matter	0.92	Shrink-swell	0.87		
		Too acid	0.97				
300:							
Bremer, terrace	90	Fair		Poor		Poor	
		Too clayey	0.01	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Too clayey	0.00
				Shrink-swell	0.69		
337D2:							
Dickman, loamy substratum, moderately eroded	45	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.12			Slope	0.37
		Too acid	0.84				
Sharpsburg, moderately eroded	40	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.37
				Shrink-swell	0.73	Too clayey	0.44
		Water erosion	0.90				
		Too clayey	0.68				
		Too acid	0.74				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
370:							
Sharpsburg	95	Fair		Poor		Poor	
		Too clayey	0.01	Low strength	0.00	Too clayey	0.00
		Water erosion	0.68	Shrink-swell	0.69		
		Too acid	0.88				
		Low content of organic matter	0.92				
370B:							
Sharpsburg	80	Fair		Poor		Poor	
		Too clayey	0.01	Low strength	0.00	Too clayey	0.00
		Water erosion	0.68	Shrink-swell	0.69		
		Too acid	0.88				
		Low content of organic matter	0.92				
371C2:							
Sharpsburg, moderately eroded	65	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Too clayey	0.44
				Shrink-swell	0.73		
		Water erosion	0.90				
		Too clayey	0.68				
		Too acid	0.74				
Nira, moderately eroded	30	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Wetness	0.53
				Wetness	0.53	Too clayey	0.53
		Water erosion	0.90	Shrink-swell	0.87		
		Too clayey	0.92				
371D2:							
Sharpsburg	45	Fair		Poor		Poor	
		Too clayey	0.01	Low strength	0.00	Too clayey	0.00
		Water erosion	0.68	Shrink-swell	0.69	Slope	0.37
		Too acid	0.88				
		Low content of organic matter	0.92				
Sharpsburg, moderately eroded	20	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.37
				Shrink-swell	0.73	Too clayey	0.44
		Water erosion	0.90				
		Too clayey	0.68				
		Too acid	0.74				
Nira, moderately eroded	20	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Wetness	0.53
				Wetness	0.53	Slope	0.37
		Water erosion	0.90	Shrink-swell	0.87	Too clayey	0.53
		Too clayey	0.92				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
371E2:							
Sharpsburg, moderately eroded	55	Fair		Poor		Poor	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.00
		Water erosion	0.90	Shrink-swell	0.73	Too clayey	0.44
		Too clayey	0.68	Slope	0.98		
		Too acid	0.74				
Nira, moderately eroded	10	Fair		Poor		Poor	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.00
		Water erosion	0.90	Wetness	0.53	Wetness	0.53
		Too clayey	0.92	Shrink-swell	0.87	Too clayey	0.53
				Slope	0.98		
430:							
Ackmore, occasionally flooded	75	Fair		Poor		Poor	
		Water erosion	0.90	Wetness	0.00	Wetness	0.00
				Low strength	0.00		
				Shrink-swell	0.33		
431B:							
Judson	50	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Low content of organic matter	0.68	Shrink-swell	0.87		
		Too acid	0.84				
Ackmore, rarely flooded	25	Fair		Poor		Poor	
		Water erosion	0.90	Wetness	0.00	Wetness	0.00
				Low strength	0.00		
				Shrink-swell	0.33		
Colo, frequently flooded, overwash	15	Fair		Poor		Poor	
		Too clayey	0.88	Wetness	0.00	Wetness	0.00
				Low strength	0.00	Too clayey	0.88
				Shrink-swell	0.87		
435:							
Zook, occasionally flooded	40	Poor		Poor		Poor	
		Too clayey	0.00	Wetness	0.00	Wetness	0.00
		Too acid	0.97	Low strength	0.00	Too clayey	0.00
				Shrink-swell	0.25		
Mt. Sterling, occasionally flooded	35	Fair		Poor		Poor	
		Water erosion	0.37	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.50	Low strength	0.00		
		Too acid	0.97	Shrink-swell	0.34		

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
469C2:							
Lamoni, moderately eroded	35	Poor		Poor		Poor	
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Too clayey	0.00
		Too clayey	0.00	Shrink-swell	0.71		
		Too acid	0.97				
Clarinda, moderately eroded	30	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00		
		Too acid	0.97				
Shelby, moderately eroded	20	Fair		Poor		Fair	
		Too clayey	0.92	Low strength	0.00	Too clayey	0.72
		Too acid	0.95	Shrink-swell	0.87	Rock fragments	0.92
						Gravel content	0.92
469C3:							
Lamoni, severely eroded	35	Fair		Poor		Poor	
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Too clayey	0.68	Low strength	0.00	Too clayey	0.39
		Too acid	0.97	Shrink-swell	0.83		
Clarinda, severely eroded	30	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Too acid	0.97	Low strength	0.00		
Shelby, severely eroded	20	Fair		Poor		Fair	
		Low content of organic matter	0.50	Low strength	0.00	Too clayey	0.44
		Too clayey	0.68	Shrink-swell	0.87	Rock fragments	0.96
		Too acid	0.97			Gravel content	0.96
470D2:							
Lamoni, moderately eroded	35	Poor		Poor		Poor	
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Slope	0.37
		Too clayey	0.00	Shrink-swell	0.71	Too clayey	0.00
		Too acid	0.97				
Shelby, moderately eroded	25	Fair		Poor		Fair	
		Too clayey	0.92	Low strength	0.00	Slope	0.37
		Too acid	0.95	Shrink-swell	0.87	Too clayey	0.72
						Rock fragments	0.92
						Gravel content	0.92

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
509B:							
Marshall, terrace	90	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Too acid	0.88	Shrink-swell	0.87		
509C:							
Marshall, terrace	90	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Too acid	0.88	Shrink-swell	0.87		
509C2:							
Marshall, terrace, moderately eroded	95	Fair		Poor		Fair	
		Water erosion	0.99	Low strength	0.00	Too clayey	0.86
		Too clayey	0.98	Shrink-swell	0.87		
545B:							
Zook	35	Poor		Poor		Poor	
		Too clayey	0.00	Wetness	0.00	Wetness	0.00
		Too acid	0.97	Low strength	0.00	Too clayey	0.00
				Shrink-swell	0.25		
Ely	30	Fair		Poor		Poor	
		Water erosion	0.99	Wetness	0.00	Wetness	0.00
		Too clayey	0.98	Low strength	0.00	Too clayey	0.98
				Shrink-swell	0.87		
Gullied land	20	Not rated		Not rated		Not rated	
733:							
Calco, occasionally flooded	90	Fair		Poor		Poor	
		Carbonate content	0.92	Wetness	0.00	Wetness	0.00
				Low strength	0.00	Carbonate content	0.92
				Shrink-swell	0.87		
803:							
Melia, terrace	90	Good		Poor		Good	
				Low strength	0.00		
824E3:							
Shelby, severely eroded	50	Fair		Poor		Poor	
		Low content of organic matter	0.50	Low strength	0.00	Slope	0.00
				Shrink-swell	0.87	Too clayey	0.44
		Too clayey	0.68	Slope	0.98	Rock fragments	0.96
		Too acid	0.97			Gravel content	0.96
Lamoni, severely eroded	30	Fair		Poor		Poor	
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
				Low strength	0.00	Slope	0.00
		Too clayey	0.68	Shrink-swell	0.83	Too clayey	0.39
		Too acid	0.97	Slope	0.98		

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value	Potential as source of topsoil: Rating class and limiting features	Value
870B:							
Sharpsburg, terrace	85	Fair		Poor		Fair	
		Too clayey	0.02	Low strength	0.00	Too clayey	0.02
		Water erosion	0.68	Shrink-swell	0.56		
		Low content of organic matter	0.50				
		Too acid	0.84				
1239:							
Corley, terrace-----	60	Fair		Poor		Poor	
		Water erosion	0.68	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.50	Low strength	0.00		
				Shrink-swell	0.40		
		Too acid	0.84				
Minden, terrace-----	30	Fair		Poor		Poor	
		Water erosion	0.90	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.88	Low strength	0.00	Too clayey	0.66
				Shrink-swell	0.87		
		Too clayey	0.92				
2428:							
Ely-----------------	45	Fair		Poor		Poor	
		Water erosion	0.99	Wetness	0.00	Wetness	0.00
		Too clayey	0.98	Low strength	0.00	Too clayey	0.98
				Shrink-swell	0.87		
Colo, overwash------	25	Fair		Poor		Poor	
		Too clayey	0.88	Wetness	0.00	Wetness	0.00
				Low strength	0.00	Too clayey	0.88
				Shrink-swell	0.87		
Mt. Sterling--------	20	Fair		Poor		Poor	
		Water erosion	0.37	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.50	Low strength	0.00		
				Shrink-swell	0.34		
		Too acid	0.97				
4946C:							
Udorthents----------	65	Not rated		Not rated		Not rated	
Interstate highway--	30	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarry-------------	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy---	100	Not rated		Not rated		Not rated	
5080:							
Udorthents, sanitary landfill--	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon-------	100	Not rated		Not rated		Not rated	

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
W:							
Water	100	Not rated		Not rated		Not rated	
Y8B:							
Judson	85	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Low content of organic matter	0.68	Shrink-swell	0.87		
		Too acid	0.84				
Y8C:							
Judson	85	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Low content of organic matter	0.68	Shrink-swell	0.87		
		Too acid	0.84				
Y24C2:							
Shelby, moderately eroded	60	Fair		Poor		Fair	
		Too clayey	0.92	Low strength	0.00	Too clayey	0.72
		Too acid	0.95	Shrink-swell	0.87	Rock fragments	0.92
						Gravel content	0.92
Y24D2:							
Shelby, moderately eroded	65	Fair		Poor		Fair	
		Too clayey	0.92	Low strength	0.00	Slope	0.37
		Too acid	0.95	Shrink-swell	0.87	Too clayey	0.72
						Rock fragments	0.92
						Gravel content	0.92
Y24D3:							
Shelby, severely eroded	55	Fair		Poor		Fair	
		Low content of organic matter	0.50	Low strength	0.00	Slope	0.37
				Shrink-swell	0.87	Too clayey	0.44
		Too clayey	0.68			Rock fragments	0.96
		Too acid	0.97			Gravel content	0.96
Y24E:							
Shelby	60	Fair		Poor		Poor	
		Too clayey	0.76	Low strength	0.00	Slope	0.00
		Too acid	0.88	Shrink-swell	0.87	Too clayey	0.60
				Slope	0.98	Rock fragments	0.92
						Gravel content	0.92
Y24E2:							
Shelby, moderately eroded	55	Fair		Poor		Poor	
		Too clayey	0.92	Low strength	0.00	Slope	0.00
		Too acid	0.95	Shrink-swell	0.87	Too clayey	0.72
				Slope	0.98	Rock fragments	0.92
						Gravel content	0.92

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y24E3:							
Shelby, severely eroded	65	Fair		Poor		Poor	
		Low content of organic matter	0.50	Low strength	0.00	Slope	0.00
		Too clayey	0.68	Shrink-swell	0.87	Too clayey	0.44
		Too acid	0.97	Slope	0.98	Rock fragments	0.96
						Gravel content	0.96
Y24F2:							
Shelby, moderately eroded	50	Fair		Poor		Poor	
		Too clayey	0.92	Low strength	0.00	Slope	0.00
		Too acid	0.95	Slope	0.18	Too clayey	0.72
				Shrink-swell	0.87	Rock fragments	0.92
						Gravel content	0.92
Y24F3:							
Shelby, severely eroded	55	Fair		Poor		Poor	
		Low content of organic matter	0.50	Low strength	0.00	Slope	0.00
		Too clayey	0.68	Slope	0.18	Too clayey	0.44
		Too acid	0.97	Shrink-swell	0.87	Rock fragments	0.96
						Gravel content	0.96
Y82C3:							
Adair, severely eroded	60	Poor		Poor		Poor	
		Too clayey	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.12	Low strength	0.00	Too clayey	0.00
		Water erosion	0.99	Shrink-swell	0.66	Rock fragments	0.88
		Too acid	0.84			Gravel content	0.88
Shelby, severely eroded	25	Fair		Poor		Fair	
		Low content of organic matter	0.50	Low strength	0.00	Too clayey	0.44
		Too clayey	0.68	Shrink-swell	0.87	Rock fragments	0.96
		Too acid	0.97			Gravel content	0.96
Y93D2:							
Shelby, moderately eroded	35	Fair		Poor		Fair	
		Too clayey	0.92	Low strength	0.00	Slope	0.37
		Too acid	0.95	Shrink-swell	0.87	Too clayey	0.72
						Rock fragments	0.92
						Gravel content	0.92
Adair, moderately eroded	25	Fair		Poor		Poor	
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Slope	0.37
		Too clayey	0.68	Shrink-swell	0.71	Too clayey	0.39
		Too acid	0.84			Rock fragments	0.96
						Gravel content	0.96

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y93D3:							
Shelby, severely eroded	35	Fair		Poor		Fair	
		Low content of organic matter	0.50	Low strength	0.00	Slope	0.37
		Too clayey	0.68	Shrink-swell	0.87	Too clayey	0.44
		Too acid	0.97			Rock fragments	0.96
						Gravel content	0.96
Adair, severely eroded	30	Poor		Poor		Poor	
		Too clayey	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.12	Low strength	0.00	Too clayey	0.00
		Water erosion	0.99	Shrink-swell	0.66	Slope	0.37
		Too acid	0.84			Rock fragments	0.88
						Gravel content	0.88
Y93E2:							
Shelby, moderately eroded	40	Fair		Poor		Poor	
		Too clayey	0.92	Low strength	0.00	Slope	0.00
		Too acid	0.95	Shrink-swell	0.87	Too clayey	0.72
				Slope	0.98	Rock fragments	0.92
						Gravel content	0.92
Adair, moderately eroded	30	Fair		Poor		Poor	
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Slope	0.00
		Too clayey	0.68	Shrink-swell	0.71	Too clayey	0.39
		Too acid	0.84	Slope	0.98	Rock fragments	0.96
		Carbonate content	0.92			Gravel content	0.96
Y192C2:							
Adair, moderately eroded	65	Fair		Poor		Poor	
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Too clayey	0.39
		Too clayey	0.68	Shrink-swell	0.47	Rock fragments	0.96
		Too acid	0.84			Gravel content	0.96
Y192D2:							
Adair, moderately eroded	55	Fair		Poor		Poor	
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Slope	0.37
		Too clayey	0.68	Shrink-swell	0.71	Too clayey	0.39
		Too acid	0.84			Rock fragments	0.96
						Gravel content	0.96
Y222C2:							
Clarinda, moderately eroded	75	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00		
		Too acid	0.97				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y222D2: Clarinda, moderately eroded	60	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Slope	0.37
		Too acid	0.97				
Y222D3: Clarinda, severely eroded	70	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Too acid	0.97	Low strength	0.00	Slope	0.37
Z8B: Judson	80	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Low content of organic matter	0.68	Shrink-swell	0.87		
		Too acid	0.84				
Z8C: Judson	75	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
		Low content of organic matter	0.68	Shrink-swell	0.87		
		Too acid	0.84				
Z24D2: Shelby, moderately eroded	55	Fair		Poor		Fair	
		Too clayey	0.92	Low strength	0.00	Slope	0.37
		Too acid	0.95	Shrink-swell	0.87	Too clayey	0.72
						Rock fragments	0.92
						Gravel content	0.92
Z24D3: Shelby, severely eroded	85	Fair		Poor		Fair	
		Low content of organic matter	0.50	Low strength	0.00	Slope	0.37
		Too clayey	0.68	Shrink-swell	0.87	Too clayey	0.44
		Too acid	0.97			Rock fragments	0.96
						Gravel content	0.96
Z24E2: Shelby, moderately eroded	50	Fair		Poor		Poor	
		Too clayey	0.92	Low strength	0.00	Slope	0.00
		Too acid	0.95	Shrink-swell	0.87	Too clayey	0.72
				Slope	0.98	Rock fragments	0.92
						Gravel content	0.92

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z24E3:							
Shelby, severely eroded	55	Fair		Poor		Poor	
		Low content of organic matter	0.50	Low strength	0.00	Slope	0.00
		Too clayey	0.68	Shrink-swell	0.87	Too clayey	0.44
		Too acid	0.97	Slope	0.98	Rock fragments	0.96
						Gravel content	0.96
Z24F2:							
Shelby, moderately eroded	60	Fair		Poor		Poor	
		Too clayey	0.92	Low strength	0.00	Slope	0.00
		Too acid	0.95	Slope	0.18	Too clayey	0.72
				Shrink-swell	0.87	Rock fragments	0.92
						Gravel content	0.92
Z82D3:							
Adair, severely eroded	35	Poor		Poor		Poor	
		Too clayey	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.12	Low strength	0.00	Too clayey	0.00
		Water erosion	0.99	Shrink-swell	0.66	Slope	0.37
		Too acid	0.84			Rock fragments	0.88
						Gravel content	0.88
Shelby, severely eroded	30	Fair		Poor		Fair	
		Low content of organic matter	0.50	Low strength	0.00	Slope	0.37
		Too clayey	0.68	Shrink-swell	0.87	Too clayey	0.44
		Too acid	0.97			Rock fragments	0.96
						Gravel content	0.96
Z93C2:							
Shelby, moderately eroded	40	Fair		Poor		Fair	
		Too clayey	0.92	Low strength	0.00	Too clayey	0.72
		Too acid	0.95	Shrink-swell	0.87	Rock fragments	0.92
						Gravel content	0.92
Adair, moderately eroded	35	Fair		Poor		Poor	
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Too clayey	0.39
		Too clayey	0.68	Shrink-swell	0.71	Rock fragments	0.96
		Too acid	0.84			Gravel content	0.96
Z93D2:							
Shelby, moderately eroded	65	Fair		Poor		Fair	
		Too clayey	0.92	Low strength	0.00	Slope	0.37
		Too acid	0.95	Shrink-swell	0.87	Too clayey	0.72
						Rock fragments	0.92
						Gravel content	0.92

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z93D2:							
Adair, moderately eroded	20	Fair		Poor		Poor	
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Slope	0.37
		Too clayey	0.68	Shrink-swell	0.71	Too clayey	0.39
		Too acid	0.84			Rock fragments	0.96
						Gravel content	0.96
Z93E2:							
Shelby, moderately eroded	45	Fair		Poor		Poor	
		Too clayey	0.92	Low strength	0.00	Slope	0.00
		Too acid	0.95	Shrink-swell	0.87	Too clayey	0.72
				Slope	0.98	Rock fragments	0.92
						Gravel content	0.92
Z192C3:							
Adair, severely eroded	55	Poor		Poor		Poor	
		Too clayey	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.12	Low strength	0.00	Too clayey	0.00
		Water erosion	0.99	Shrink-swell	0.66	Rock fragments	0.88
		Too acid	0.84			Gravel content	0.88
Z222D2:							
Clarinda, moderately eroded	70	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Low strength	0.00	Slope	0.37
		Too acid	0.97				

Water Management

The table “Ponds and Embankments” gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Ponds and Embankments

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7:							
Wiota, rarely flooded	85	Somewhat limited Seepage	 0.70	Not limited		Somewhat limited Slow refill Depth to saturated zone Unstable excavation walls	 0.30 0.81 0.10
7B:							
Wiota, rarely flooded	85	Somewhat limited Seepage Slope	 0.70 0.08	Not limited		Somewhat limited Slow refill Depth to saturated zone Unstable excavation walls	 0.30 0.81 0.10
9:							
Marshall	90	Somewhat limited Seepage	 0.70	Not limited		Very limited Depth to water	 1.00
9B:							
Marshall	100	Somewhat limited Seepage Slope	 0.70 0.08	Not limited		Very limited Depth to water	 1.00
9C2:							
Marshall, moderately eroded	80	Somewhat limited Slope Seepage	 0.92 0.05	Not limited		Very limited Depth to water	 1.00
9C3:							
Marshall, severely eroded	80	Somewhat limited Slope Seepage	 0.92 0.05	Not limited		Very limited Depth to water	 1.00
9D2:							
Marshall, moderately eroded	70	Very limited Slope Seepage	 1.00 0.05	Not limited		Very limited Depth to water	 1.00
15B:							
Olmitz	35	Somewhat limited Seepage Slope	 0.24 0.08	Not limited		Somewhat limited Slow refill Depth to saturated zone Unstable excavation walls	 0.76 0.81 0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15B:							
Ely	30	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.24	Depth to saturated zone	1.00	Slow refill	0.76
		Slope	0.08			Unstable excavation walls	0.10
Zook	20	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.95
		Slope	0.08	Hard to pack	0.18	Unstable excavation walls	0.10
16:							
Nodaway, occasionally flooded	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.24	Piping	0.08	Slow refill	0.76
						Depth to saturated zone	0.81
						Unstable excavation walls	0.10
Kennebec, occasionally flooded	35	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.70	Piping	1.00	Slow refill	0.30
						Depth to saturated zone	0.81
						Unstable excavation walls	0.10
43:							
Bremer, rarely flooded	80	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.95
				Hard to pack	0.11	Unstable excavation walls	0.10
54:							
Zook, occasionally flooded	90	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.95
				Hard to pack	0.18	Unstable excavation walls	0.10
54+:							
Zook, occasionally flooded, overwash	80	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.76
						Unstable excavation walls	0.10
88:							
Nevin, rarely flooded	90	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.95
						Unstable excavation walls	0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99D2:							
Exira, moderately eroded	65	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.08	Depth to water	1.00
		Seepage	0.70				
99D3:							
Exira, severely eroded	75	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.06	Depth to water	1.00
		Seepage	0.70				
99E2:							
Exira, moderately eroded	75	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.08	Depth to water	1.00
		Seepage	0.70				
99E3:							
Exira, severely eroded	80	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.06	Depth to water	1.00
		Seepage	0.70				
113B:							
Colo, frequently flooded, overwash	50	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.30
						Unstable excavation walls	0.10
Ely	25	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.24	Depth to saturated zone	1.00	Slow refill	0.76
						Unstable excavation walls	0.10
136:							
Ankeny, occasionally flooded	95	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
212:							
Kennebec, occasionally flooded	70	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.70	Piping	1.00	Slow refill	0.30
						Depth to saturated zone	0.81
						Unstable excavation walls	0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
220:							
Nodaway, occasionally flooded	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.24	Piping	0.08	Slow refill	0.76
						Depth to saturated zone	0.81
						Unstable excavation walls	0.10
229C2:							
Clarinda, moderately eroded	40	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Depth to saturated zone	1.00	Depth to water	1.00
				Hard to pack	0.92		
Clarinda, severely eroded	20	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Depth to saturated zone	1.00	Depth to water	1.00
				Hard to pack	0.92		
229D2:							
Clarinda, moderately eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
				Hard to pack	0.92		
Clarinda, severely eroded	20	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
				Hard to pack	0.92		
247D2:							
Shelby, sandy substratum, moderately eroded	35	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.31	Depth to water	1.00
		Seepage	1.00				
Hesch, deep, moderately eroded	25	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Thin layer	0.13	Depth to water	1.00
		Seepage	1.00				
Hesch, moderately eroded	20	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Thin layer	0.91	Depth to water	1.00
		Seepage	1.00				
		Depth to bedrock	0.17				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
269:							
Humeston, occasionally flooded, occasionally ponded	100	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.70	Depth to saturated zone	1.00	Slow refill	0.30
				Ponding	1.00	Unstable excavation walls	0.10
273B:							
Olmitz	80	Somewhat limited		Not limited		Somewhat limited	
		Seepage	0.05			Slow refill	0.95
		Slope	0.08			Depth to saturated zone	0.81
						Unstable excavation walls	0.10
289D2:							
Dickman, loamy substratum, moderately eroded	35	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.17	Depth to water	1.00
		Slope	1.00				
Marshall, moderately eroded	30	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
300:							
Bremer, terrace	90	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.95
				Hard to pack	0.11	Unstable excavation walls	0.10
337D2:							
Dickman, loamy substratum, moderately eroded	45	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
		Slope	1.00				
Sharpsburg, moderately eroded	40	Very limited		Not limited		Somewhat limited	
		Slope	1.00			Slow refill	0.95
		Seepage	0.05			Depth to saturated zone	0.81
						Unstable excavation walls	0.10
370:							
Sharpsburg	95	Somewhat limited		Not limited		Somewhat limited	
		Seepage	0.05			Slow refill	0.95
						Depth to saturated zone	0.81
						Unstable excavation walls	0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
370B:							
Sharpsburg	80	Somewhat limited		Not limited		Somewhat limited	
		Seepage	0.05			Slow refill	0.95
		Slope	0.08			Depth to saturated zone	0.81
						Unstable excavation walls	0.10
371C2:							
Sharpsburg, moderately eroded	65	Somewhat limited		Not limited		Somewhat limited	
		Slope	0.92			Slow refill	0.95
		Seepage	0.05			Depth to saturated zone	0.81
						Unstable excavation walls	0.10
Nira, moderately eroded	30	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.92	Depth to saturated zone	1.00	Slow refill	0.76
		Seepage	0.24			Unstable excavation walls	0.10
371D2:							
Sharpsburg	45	Very limited		Not limited		Somewhat limited	
		Slope	1.00			Slow refill	0.95
		Seepage	0.05			Depth to saturated zone	0.81
						Unstable excavation walls	0.10
Sharpsburg, moderately eroded	20	Very limited		Not limited		Somewhat limited	
		Slope	1.00			Slow refill	0.95
		Seepage	0.05			Depth to saturated zone	0.81
						Unstable excavation walls	0.10
Nira, moderately eroded	20	Very limited		Very limited		Somewhat limited	
		Slope	1.00	Depth to saturated zone	1.00	Slow refill	0.76
		Seepage	0.24			Unstable excavation walls	0.10
371E2:							
Sharpsburg, moderately eroded	55	Very limited		Not limited		Somewhat limited	
		Slope	1.00			Slow refill	0.95
		Seepage	0.05			Depth to saturated zone	0.81
						Unstable excavation walls	0.10
Nira, moderately eroded	10	Very limited		Very limited		Somewhat limited	
		Slope	1.00	Depth to saturated zone	1.00	Slow refill	0.76
		Seepage	0.24			Unstable excavation walls	0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
430:							
Ackmore, occasionally flooded	75	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.70	Depth to saturated zone	1.00	Slow refill	0.30
						Unstable excavation walls	0.10
431B:							
Judson	50	Somewhat limited		Not limited		Very limited	
		Seepage	0.05			Depth to water	1.00
		Slope	0.08				
Ackmore, rarely flooded	25	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.70	Depth to saturated zone	1.00	Slow refill	0.30
						Unstable excavation walls	0.10
Colo, frequently flooded, overwash	15	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.30
						Unstable excavation walls	0.10
435:							
Zook, occasionally flooded	40	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.95
				Hard to pack	0.18	Unstable excavation walls	0.10
Mt. Sterling, occasionally flooded	35	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.70	Depth to saturated zone	1.00	Slow refill	0.30
						Unstable excavation walls	0.10
469C2:							
Lamoni, moderately eroded	35	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Depth to saturated zone	1.00	Depth to water	1.00
		Seepage	0.05				
Clarinda, moderately eroded	30	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Depth to saturated zone	1.00	Depth to water	1.00
				Hard to pack	0.92		
Shelby, moderately eroded	20	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to water	1.00
		Seepage	0.05				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
469C3:							
Lamoni, severely eroded	35	Somewhat limited Slope Seepage	 0.92 0.05	Very limited Depth to saturated zone	 1.00	Very limited Depth to water	 1.00
Clarinda, severely eroded	30	Somewhat limited Slope	 0.92	Very limited Depth to saturated zone Hard to pack	 1.00 0.92	Very limited Depth to water	 1.00
Shelby, severely eroded	20	Somewhat limited Slope Seepage	 0.92 0.05	Not limited		Very limited Depth to water	 1.00
470D2:							
Lamoni, moderately eroded	35	Very limited Slope Seepage	 1.00 0.05	Very limited Depth to saturated zone	 1.00	Very limited Depth to water	 1.00
Shelby, moderately eroded	25	Very limited Slope Seepage	 1.00 0.05	Not limited		Very limited Depth to water	 1.00
509B:							
Marshall, terrace	90	Somewhat limited Seepage Slope	 0.70 0.08	Not limited		Very limited Depth to water	 1.00
509C:							
Marshall, terrace	90	Somewhat limited Slope Seepage	 0.92 0.70	Not limited		Very limited Depth to water	 1.00
509C2:							
Marshall, terrace, moderately eroded	95	Somewhat limited Slope Seepage	 0.92 0.05	Not limited		Very limited Depth to water	 1.00
545B:							
Zook	35	Somewhat limited Seepage Slope	 0.05 0.08	Very limited Depth to saturated zone Hard to pack	 1.00 0.18	Somewhat limited Slow refill Unstable excavation walls	 0.95 0.10
Ely	30	Somewhat limited Seepage Slope	 0.24 0.08	Very limited Depth to saturated zone	 1.00	Somewhat limited Slow refill Unstable excavation walls	 0.76 0.10
Gullied land	20	Not rated		Not rated		Not rated	

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
733:							
Calco, occasionally flooded	90	Somewhat limited Seepage	 0.05	Very limited Depth to saturated zone	 1.00	Somewhat limited Slow refill Unstable excavation walls	 0.95 0.10
803:							
Melia, terrace	90	Somewhat limited Seepage	 0.05	Not limited		Very limited Depth to water	 1.00
824E3:							
Shelby, severely eroded	50	Very limited Slope Seepage	 1.00 0.05	Not limited		Very limited Depth to water	 1.00
Lamoni, severely eroded	30	Very limited Slope Seepage	 1.00 0.05	Very limited Depth to saturated zone	 1.00	Very limited Depth to water	 1.00
870B:							
Sharpsburg, terrace	85	Somewhat limited Seepage	 0.05	Not limited		Somewhat limited Slow refill Depth to saturated zone Unstable excavation walls	 0.95 0.81 0.10
1239:							
Corley, terrace	60	Somewhat limited Seepage	 0.70	Very limited Depth to saturated zone	 1.00	Somewhat limited Slow refill Unstable excavation walls	 0.30 0.10
Minden, terrace	30	Somewhat limited Seepage	 0.70	Very limited Depth to saturated zone	 1.00	Somewhat limited Slow refill Unstable excavation walls	 0.30 0.10
2428:							
Ely	45	Somewhat limited Seepage	 0.24	Very limited Depth to saturated zone	 1.00	Somewhat limited Slow refill Unstable excavation walls	 0.76 0.10
Colo, overwash	25	Somewhat limited Seepage	 0.05	Very limited Depth to saturated zone	 1.00	Somewhat limited Slow refill Unstable excavation walls	 0.30 0.10
Mt. Sterling	20	Somewhat limited Seepage	 0.70	Very limited Depth to saturated zone	 1.00	Somewhat limited Slow refill Unstable excavation walls	 0.30 0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4946C:							
Udorthents----------	65	Not rated		Not rated		Not rated	
Interstate highway--	30	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarry-------------	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy---	100	Not rated		Not rated		Very limited	
						Depth to water	1.00
5080:							
Udorthents, sanitary landfill--	100	Not rated		Not rated		Very limited	
						Depth to water	1.00
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon-------	100	Not rated		Not rated		Not rated	
W:							
Water---------------	100	Not rated		Not rated		Not rated	
Y8B:							
Judson--------------	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.05			Depth to water	1.00
		Slope	0.08				
Y8C:							
Judson--------------	85	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to water	1.00
		Seepage	0.05				
Y24C2:							
Shelby, moderately eroded-------------	60	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to water	1.00
		Seepage	0.05				
Y24D2:							
Shelby, moderately eroded-------------	65	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Y24D3:							
Shelby, severely eroded-------------	55	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Y24E:							
Shelby--------------	60	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y24E2:							
Shelby, moderately eroded	55	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Y24E3:							
Shelby, severely eroded	65	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Y24F2:							
Shelby, moderately eroded	50	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Y24F3:							
Shelby, severely eroded	55	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Y82C3:							
Adair, severely eroded	60	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Depth to saturated zone	1.00	Depth to water	1.00
		Seepage	0.05				
Shelby, severely eroded	25	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to water	1.00
		Seepage	0.05				
Y93D2:							
Shelby, moderately eroded	35	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Adair, moderately eroded	25	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
		Seepage	0.05				
Y93D3:							
Shelby, severely eroded	35	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Adair, severely eroded	30	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
		Seepage	0.05				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Y93E2:							
Shelby, moderately eroded	40	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Adair, moderately eroded	30	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
		Seepage	0.05				
Y192C2:							
Adair, moderately eroded	65	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Depth to saturated zone	1.00	Depth to water	1.00
Y192D2:							
Adair, moderately eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
		Seepage	0.05				
Y222C2:							
Clarinda, moderately eroded	75	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Depth to saturated zone	1.00	Depth to water	1.00
				Hard to pack	0.92		
Y222D2:							
Clarinda, moderately eroded	60	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
				Hard to pack	0.92		
Y222D3:							
Clarinda, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
				Hard to pack	0.92		
Z8B:							
Judson	80	Somewhat limited		Not limited		Very limited	
		Seepage	0.05			Depth to water	1.00
		Slope	0.08				
Z8C:							
Judson	75	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to water	1.00
		Seepage	0.05				
Z24D2:							
Shelby, moderately eroded	55	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z24D3:							
Shelby, severely eroded-------------	85	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Z24E2:							
Shelby, moderately eroded-------------	50	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Z24E3:							
Shelby, severely eroded-------------	55	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Z24F2:							
Shelby, moderately eroded-------------	60	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Z82D3:							
Adair, severely eroded-------------	35	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
		Seepage	0.05				
Shelby, severely eroded-------------	30	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Z93C2:							
Shelby, moderately eroded-------------	40	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to water	1.00
		Seepage	0.05				
Adair, moderately eroded-------------	35	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Depth to saturated zone	1.00	Depth to water	1.00
		Seepage	0.05				
Z93D2:							
Shelby, moderately eroded-------------	65	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Adair, moderately eroded-------------	20	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
		Seepage	0.05				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Z93E2:							
Shelby, moderately eroded	45	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Adair, moderately eroded	35	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
		Seepage	0.05				
Z192C3:							
Adair, severely eroded	55	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Depth to saturated zone	1.00	Depth to water	1.00
		Seepage	0.05				
Z222D2:							
Clarinda, moderately eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
				Hard to pack	0.92		

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Properties

The table described in this section gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary in Part I.

Classification of the soils is determined according to the Unified soil classification system (ASTM) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487–00.

Engineering Properties

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
7:												
Wiota, rarely flooded--------	0-8	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	92-100	87-99	38-52	13-22
	8-28	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	92-100	87-99	37-51	13-22
	28-59	Silty clay loam	CL	A-7	0	0	100	100	97-100	93-98	41-49	21-25
	59-80	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	94-100	35-46	17-24
7B:												
Wiota, rarely flooded--------	0-8	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	92-100	87-99	38-52	13-22
	8-28	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	92-100	87-99	37-51	13-22
	28-59	Silty clay loam	CL	A-7	0	0	100	100	97-100	93-98	41-49	21-25
	59-80	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	94-100	35-46	17-24
9:												
Marshall--------	0-7	Silty clay loam, silt loam	CL	A-7-6	0	0	100	100	93-100	92-100	41-53	17-25
	7-22	Silty clay loam	CL	A-7-6	0	0	100	100	94-100	92-100	41-52	18-25
	22-65	Silty clay loam	CL	A-6, A-7-6	0	0	100	100	96-100	95-100	36-48	18-25
	65-71	Silty clay loam, silt loam	CL	A-6, A-7-6	0	0	100	100	97-100	96-100	34-42	17-21
	71-80	Silty clay loam, silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	97-100	96-100	34-41	17-21
9B:												
Marshall--------	0-7	Silty clay loam, silt loam	CL	A-7-6	0	0	100	100	93-100	92-100	41-53	17-25
	7-22	Silty clay loam	CL	A-7-6	0	0	100	100	94-100	92-100	41-52	18-25
	22-65	Silty clay loam	CL	A-6, A-7-6	0	0	100	100	96-100	95-100	36-48	18-25
	65-71	Silty clay loam, silt loam	CL	A-6, A-7-6	0	0	100	100	97-100	96-100	34-42	17-21
	71-80	Silty clay loam, silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	97-100	96-100	34-41	17-21

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
9C2:												
Marshall, moderately eroded	0-7	Silty clay loam	CL	A-7	0	0	100	100	95-100	93-100	41-52	19-25
	7-50	Silty clay loam	CL	A-7, A-6	0	0	100	100	96-100	94-100	38-47	19-25
	50-62	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	97-100	95-100	35-46	17-25
	62-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	97-100	95-100	35-46	17-25
9C3:												
Marshall, severely eroded	0-5	Silty clay loam	CL	A-7, A-6	0	0	100	100	97-100	95-100	39-50	19-25
	5-41	Silty clay loam	CL	A-7, A-6	0	0	100	100	97-100	96-100	38-47	19-25
	41-50	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	97-100	95-100	35-46	17-25
	50-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	97-100	95-100	35-47	17-25
9D2:												
Marshall, moderately eroded	0-7	Silty clay loam	CL	A-7	0	0	100	100	95-100	93-100	41-52	19-25
	7-50	Silty clay loam	CL	A-7, A-6	0	0	100	100	96-100	94-100	38-47	19-25
	50-62	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	97-100	95-100	35-46	17-25
	62-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	97-100	95-100	35-46	17-25
15B:												
Olmitz	0-7	Loam	CL	A-6	0	0	100	90-100	79-91	59-68	40-47	16-19
	7-30	Clay loam, loam	CL	A-6	0	0	100	90-100	76-97	58-77	37-50	15-24
	30-60	Clay loam	CL	A-6, A-7	0	0	100	90-100	79-94	61-74	39-48	19-24
Ely	0-8	Silty clay loam, silt loam	CL	A-7	0	0	100	100	90-100	84-99	39-56	13-24
	8-32	Silty clay loam	CL	A-7	0	0	100	100	94-100	88-96	45-55	18-25
	32-58	Silty clay loam	CL	A-7, A-6	0	0	100	100	94-100	88-96	39-51	19-25
	58-80	Silty clay loam, silt loam	CL	A-6	0	0	100	100	89-100	83-100	30-47	12-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
15B:												
Zook------------	0-7	Silty clay loam, silty clay	CH	A-7	0	0	100	100	98-100	93-100	51-68	22-32
	7-20	Silty clay loam, silty clay	CH	A-7	0	0	100	100	94-100	90-100	51-68	22-32
	20-38	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	90-100	86-99	49-65	23-32
	38-61	Silty clay loam, silty clay	CH	A-7	0	0	100	100	96-100	92-100	50-63	26-32
	61-80	Silty clay loam, silty clay, silt loam	CL, CH	A-7, A-6	0	0	100	100	87-100	83-100	31-56	13-32
16:												
Nodaway, occasionally flooded--------	0-7	Silt loam, silty clay loam	CL	A-6	0	0	100	95-100	87-100	83-100	30-48	11-24
	7-80	Stratified silt loam to silty clay loam, silt loam, silty clay loam	CL	A-6	0	0	100	95-100	86-100	82-100	29-46	12-25
Kennebec, occasionally flooded--------	0-8	Silt loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	25-45	10-20
	8-54	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
	54-80	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
43:												
Bremer, rarely flooded--------	0-8	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	91-100	45-59	18-25
	8-19	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	91-100	45-59	18-25
	19-42	Silty clay loam, silty clay	CH	A-7	0	0	100	100	94-100	89-99	47-59	25-33
	42-50	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	90-100	40-51	21-29
	50-60	Silty clay loam	CH, CL	A-7	0	0	100	100	91-100	82-97	36-51	17-29

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
54:												
Zook, occasionally flooded	0-7	Silty clay loam, silty clay	CH	A-7	0	0	100	100	98-100	93-100	51-68	22-32
	7-20	Silty clay loam, silty clay	CH	A-7	0	0	100	100	94-100	90-100	51-68	22-32
	20-38	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	90-100	86-99	49-65	23-32
	38-61	Silty clay loam, silty clay	CH	A-7	0	0	100	100	96-100	92-100	50-63	26-32
	61-80	Silty clay loam, silty clay, silt loam	CL, CH	A-7, A-6	0	0	100	100	87-100	83-100	31-56	13-32
54+:												
Zook, occasionally flooded, overwash	0-7	Silt loam	CL	A-6	0	0	100	100	95-100	86-98	35-46	13-18
	7-13	Silt loam	CL	A-6	0	0	100	100	95-100	86-98	35-46	13-18
	13-50	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	93-100	88-100	49-65	23-32
	50-58	Silty clay loam, silty clay	CH	A-7	0	0	100	100	96-100	92-100	50-63	26-32
	58-80	Silty clay loam, silty clay, silt loam	CL, CH	A-7, A-6	0	0	100	100	87-100	83-100	31-56	13-32
88:												
Nevin, rarely flooded	0-8	Silty clay loam, silt loam	CL	A-7	0	0	100	100	97-100	93-96	42-51	17-20
	8-24	Silty clay loam	CL	A-7	0	0	100	100	97-100	93-96	44-53	18-20
	24-46	Silty clay loam	CL	A-7	0	0	100	100	97-100	92-97	41-49	21-25
	46-62	Silty clay loam, silt loam	CL	A-7	0	0	100	100	94-100	89-100	35-47	17-26
99D2:												
Exira, moderately eroded	0-6	Silty clay loam	CL	A-7, A-6	0	0	100	100	98-100	96-100	40-51	19-24
	6-33	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	98-100	96-100	36-47	17-25
	33-37	Silt loam	CL	A-6, A-7	0	0	100	100	100	99-100	35-46	17-25
	37-80	Silt loam	CL	A-6, A-7	0	0	100	100	95-100	93-100	31-42	13-21

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
99D3:												
Exira, severely eroded---------	0-5	Silty clay loam	CL	A-7, A-6	0	0	100	100	96-100	95-100	40-49	19-24
	5-36	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	97-100	96-100	35-46	17-25
	36-44	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	96-100	35-46	17-25
	44-80	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	94-100	31-42	13-21
99E2:												
Exira, moderately eroded---------	0-6	Silty clay loam	CL	A-7, A-6	0	0	100	100	98-100	96-100	40-51	19-24
	6-33	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	98-100	96-100	36-47	17-25
	33-37	Silt loam	CL	A-6, A-7	0	0	100	100	100	99-100	35-46	17-25
	37-80	Silt loam	CL	A-6, A-7	0	0	100	100	95-100	93-100	31-42	13-21
99E3:												
Exira, severely eroded---------	0-5	Silty clay loam	CL	A-7, A-6	0	0	100	100	96-100	95-100	40-49	19-24
	5-36	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	97-100	96-100	35-46	17-25
	36-44	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	96-100	35-46	17-25
	44-80	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	94-100	31-42	13-21
113B:												
Colo, frequently flooded, overwash-------	0-7	Silt loam	CL	A-6	0	0	100	100	96-100	90-100	37-51	13-21
	7-15	Silt loam	CL	A-6	0	0	100	100	96-100	90-100	37-51	13-21
	15-50	Silty clay loam	CL, CH	A-7	0	0	100	100	97-100	93-98	45-53	21-25
	50-70	Silty clay loam	CL	A-7	0	0	100	100	97-100	93-98	41-49	21-25
	70-80	Silty clay loam	CL	A-7	0	0	100	100	97-100	93-98	39-47	21-25
Ely-------------	0-8	Silty clay loam, silt loam	CL	A-7	0	0	100	100	90-100	84-99	39-56	13-24
	8-32	Silty clay loam	CL	A-7	0	0	100	100	94-100	88-96	45-55	18-25
	32-58	Silty clay loam	CL	A-7, A-6	0	0	100	100	94-100	88-96	39-51	19-25
	58-80	Silty clay loam, silt loam	CL	A-6	0	0	100	100	89-100	83-100	30-47	12-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
136: Ankeny, occasionally flooded	0-7	Fine sandy loam	SC, SM, SC-SM	A-4, A-2	0	0-5	95-100	95-100	75-90	30-50	15-25	2-10
	7-30	Fine sandy loam	SC, SM, SC-SM	A-4, A-2	0	0-5	95-100	95-100	75-90	30-50	15-25	2-10
	30-44	Fine sandy loam, sandy loam	SC, SM, SC-SM	A-2, A-4	0	0-5	95-100	95-100	75-90	25-45	15-25	2-10
	44-60	Loamy sand, loamy fine sand, fine sandy loam, fine sand	SC, SC-SM, SM, SW-SM	A-2, A-4, A-3	0	0-5	95-100	95-100	70-80	5-40	15-25	NP-10
212: Kennebec, occasionally flooded	0-8	Silt loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	25-45	10-20
	8-54	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
	54-80	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
220: Nodaway, occasionally flooded	0-7	Silt loam, silty clay loam	CL	A-6	0	0	100	95-100	87-100	83-100	30-48	11-24
	7-80	Stratified silt loam to silty clay loam, silt loam, silty clay loam	CL	A-6	0	0	100	95-100	86-100	82-100	29-46	12-25
229C2: Clarinda, moderately eroded	0-6	Silty clay loam	CL	A-7	0	0	100	94-100	87-100	84-100	39-56	17-28
	6-80	Silty clay, clay	CH	A-7	0	0	94-100	89-100	79-100	75-100	51-71	29-44
Clarinda, severely eroded	0-4	Silty clay, clay	CH	A-7	0	0	100	94-100	86-100	82-100	53-69	29-40
	4-80	Silty clay, clay	CH	A-7	0	0	94-100	89-100	79-100	75-100	49-69	29-44

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
229D2:												
Clarinda, moderately eroded---------	0-6	Silty clay loam	CL	A-7	0	0	100	94-100	87-100	84-100	39-56	17-28
	6-80	Silty clay, clay	CH	A-7	0	0	94-100	89-100	79-100	75-100	51-71	29-44
Clarinda, severely eroded	0-4	Silty clay, clay	CH	A-7	0	0	100	94-100	86-100	82-100	53-69	29-40
	4-80	Silty clay, clay	CH	A-7	0	0	94-100	89-100	79-100	75-100	49-69	29-44
247D2:												
Shelby, sandy substratum, moderately eroded---------	0-5	Loam	CL	A-6	0	0	95-100	82-100	73-95	57-76	35-44	13-18
	5-33	Clay loam	CL	A-6, A-7	0	0-4	90-95	81-95	71-91	56-73	39-50	21-27
	33-51	Loam	CL	A-6	0	0-4	91-95	81-95	72-90	57-72	31-38	13-18
	51-80	Fine sandy loam	SC-SM	A-6	0	0-4	91-95	82-95	72-94	32-47	20-32	4-12
Hesch, deep, moderately eroded---------	0-7	Loam	CL	A-6	0	0	95-100	82-100	73-95	57-76	35-44	13-18
	7-18	Loam, sandy loam	SC-SM	A-4	0	0	100	100	80-96	54-70	22-38	6-18
	18-39	Fine sandy loam, sandy loam, loam	SC, SC-SM	A-4, A-2	0	0	95-100	79-100	70-97	30-46	20-30	6-12
	39-49	Loamy fine sand, sand, fine sand	SM	A-2, A-4	0	0	96-100	79-100	73-98	24-37	0-21	NP-4
	49-80	Bedrock	---	---	---	---	---	---	---	---	0-14	NP
Hesch, moderately eroded---------	0-9	Loam, sandy loam	ML, CL, CL-ML	A-4	0	0	95-100	78-100	62-96	44-74	25-43	6-18
	9-17	Clay loam	CL	A-6, A-7	0	0-4	90-95	81-95	71-92	56-74	37-47	19-25
	17-28	Loamy fine sand, sand, fine sand	SM	A-2	0	0	96-100	79-100	74-97	23-34	0-19	NP-2
	28-80	Bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
269:												
Humeston, occasionally flooded, occasionally ponded---------	0-11	Silty clay loam, silt loam	CL	A-6	0	0	100	100	97-100	88-94	40-49	16-21
	11-25	Silt loam	CL	A-6	0	0	100	100	94-100	85-91	33-42	13-18
	25-31	Silty clay loam	CL	A-7	0	0	100	100	97-100	89-94	40-48	21-25
	31-72	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	94-100	90-100	47-61	25-35
	72-80	Silty clay loam	CL, CH	A-7	0	0	100	100	96-100	89-97	40-50	21-27
273B:												
Olmitz----------	0-7	Loam	CL	A-6	0	0	100	90-100	79-91	59-68	40-47	16-19
	7-30	Clay loam, loam	CL	A-6	0	0	100	90-100	76-97	58-77	37-50	15-24
	30-60	Clay loam	CL	A-6, A-7	0	0	100	90-100	79-94	61-74	39-48	19-24
289D2:												
Dickman, loamy substratum, moderately eroded---------	0-6	Fine sandy loam	SC-SM	A-4, A-2	0	0	95-100	90-100	80-97	32-44	22-33	6-12
	6-19	Fine sandy loam, sandy loam	SC, SC-SM	A-4, A-2	0	0	95-100	90-100	80-97	32-44	20-31	6-12
	19-46	Loamy fine sand	SM	A-2	0	0	95-100	90-100	82-97	21-29	15-23	1-6
	46-56	Fine sandy loam	SC-SM	A-2	0	0	95-100	90-100	80-97	32-44	20-30	6-12
	56-69	Fine sand	SM	A-2	0	0	95-100	91-100	83-97	15-22	15-23	1-6
	69-80	Silt loam, silty clay loam	CL	A-7, A-6	0	0	100	100	98-100	97-100	35-46	17-25
Marshall, moderately eroded---------	0-7	Silty clay loam	CL	A-7	0	0	100	100	95-100	93-100	41-52	19-25
	7-50	Silty clay loam	CL	A-7, A-6	0	0	100	100	96-100	94-100	38-47	19-25
	50-62	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	97-100	95-100	35-46	17-25
	62-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	97-100	95-100	35-46	17-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
300:												
Bremer, terrace	0-8	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	91-100	45-59	18-25
	8-19	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	91-100	45-59	18-25
	19-42	Silty clay loam, silty clay	CH	A-7	0	0	100	100	94-100	89-99	47-59	25-33
	42-50	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	90-100	40-51	21-29
	50-60	Silty clay loam	CH, CL	A-7	0	0	100	100	91-100	82-97	36-51	17-29
337D2:												
Dickman, loamy substratum, moderately eroded---------	0-6	Fine sandy loam	SC-SM	A-4	0	0	95-100	90-100	76-92	46-59	22-33	6-12
	6-19	Fine sandy loam, sandy loam	SC, SC-SM	A-4, A-2	0	0	95-100	90-100	80-97	32-44	20-31	6-12
	19-46	Loamy fine sand	SM	A-2	0	0	95-100	90-100	82-97	21-29	15-23	1-6
	46-56	Fine sandy loam	SC-SM	A-2	0	0	95-100	90-100	80-97	32-44	20-30	6-12
	56-69	Fine sand	SM	A-2	0	0	95-100	91-100	83-97	15-22	15-23	1-6
	69-80	Silt loam, silty clay loam	CL	A-7, A-6	0	0	100	100	98-100	97-100	35-46	17-25
Sharpsburg, moderately eroded---------	0-8	Silty clay loam	CL, CH	A-7	0	0	100	100	93-100	92-99	42-52	18-24
	8-21	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	97-100	96-100	47-56	26-30
	21-40	Silty clay loam	CL	A-7, A-6	0	0	100	100	94-100	92-100	38-50	19-27
	40-48	Silty clay loam	CL	A-7, A-6	0	0	100	100	96-100	95-100	38-49	19-27
	48-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	96-100	94-100	35-46	17-25
370:												
Sharpsburg------	0-8	Silty clay loam	CL, CH	A-7	0	0	100	100	95-100	94-100	43-53	18-24
	8-17	Silty clay loam	CL, CH	A-7	0	0	100	100	98-100	97-100	43-51	21-24
	17-31	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	96-100	95-100	47-55	26-31
	31-38	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	90-100	89-99	35-46	17-25
	38-46	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	93-100	92-100	35-46	17-25
	46-60	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	96-100	95-100	35-47	17-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
370B:												
Sharpsburg------	0-8	Silty clay loam	CL, CH	A-7	0	0	100	100	95-100	94-100	43-53	18-24
	8-17	Silty clay loam	CL, CH	A-7	0	0	100	100	98-100	97-100	43-51	21-24
	17-31	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	96-100	95-100	47-55	26-31
	31-38	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	90-100	89-99	35-46	17-25
	38-46	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	93-100	92-100	35-46	17-25
	46-60	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	96-100	95-100	35-47	17-25
371C2:												
Sharpsburg, moderately eroded---------	0-8	Silty clay loam	CL, CH	A-7	0	0	100	100	93-100	92-99	42-52	18-24
	8-21	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	97-100	96-100	47-56	26-30
	21-40	Silty clay loam	CL	A-7, A-6	0	0	100	100	94-100	92-100	38-50	19-27
	40-48	Silty clay loam	CL	A-7, A-6	0	0	100	100	96-100	95-100	38-49	19-27
	48-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	96-100	94-100	35-46	17-25
Nira, moderately eroded---------	0-7	Silty clay loam	CL, CH	A-7	0	0	100	100	98-100	96-100	44-51	21-24
	7-12	Silty clay loam	CL	A-7	0	0	100	100	99-100	97-100	42-49	23-27
	12-44	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	96-100	39-45	21-24
	44-60	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	95-100	35-42	17-21
	60-80	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	95-100	35-42	17-21
371D2:												
Sharpsburg------	0-8	Silty clay loam	CL, CH	A-7	0	0	100	100	95-100	94-100	43-53	18-24
	8-17	Silty clay loam	CL, CH	A-7	0	0	100	100	98-100	97-100	43-51	21-24
	17-31	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	96-100	95-100	47-55	26-31
	31-38	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	90-100	89-99	35-46	17-25
	38-46	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	93-100	92-100	35-46	17-25
	46-60	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	96-100	95-100	35-47	17-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
371D2:												
Sharpsburg, moderately eroded---------	0-8	Silty clay loam	CL, CH	A-7	0	0	100	100	93-100	92-99	42-52	18-24
	8-21	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	97-100	96-100	47-56	26-30
	21-40	Silty clay loam	CL	A-7, A-6	0	0	100	100	94-100	92-100	38-50	19-27
	40-48	Silty clay loam	CL	A-7, A-6	0	0	100	100	96-100	95-100	38-49	19-27
	48-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	96-100	94-100	35-46	17-25
Nira, moderately eroded---------	0-7	Silty clay loam	CL, CH	A-7	0	0	100	100	98-100	96-100	44-51	21-24
	7-12	Silty clay loam	CL	A-7	0	0	100	100	99-100	97-100	42-49	23-27
	12-44	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	96-100	39-45	21-24
	44-60	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	95-100	35-42	17-21
	60-80	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	95-100	35-42	17-21
371E2:												
Sharpsburg, moderately eroded---------	0-8	Silty clay loam	CL, CH	A-7	0	0	100	100	93-100	92-99	42-52	18-24
	8-21	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	97-100	96-100	47-56	26-30
	21-40	Silty clay loam	CL	A-7, A-6	0	0	100	100	94-100	92-100	38-50	19-27
	40-48	Silty clay loam	CL	A-7, A-6	0	0	100	100	96-100	95-100	38-49	19-27
	48-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	96-100	94-100	35-46	17-25
Nira, moderately eroded---------	0-7	Silty clay loam	CL, CH	A-7	0	0	100	100	98-100	96-100	44-51	21-24
	7-12	Silty clay loam	CL	A-7	0	0	100	100	99-100	97-100	42-49	23-27
	12-44	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	96-100	39-45	21-24
	44-60	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	95-100	35-42	17-21
	60-80	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	95-100	35-42	17-21

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
430:												
Ackmore, occasionally flooded--------	0-6	Silt loam, silty clay loam	ML, CL	A-6, A-7, A-4	0	0	100	100	95-100	90-100	31-47	10-21
	6-25	Silt loam, silty clay loam	ML, CL	A-6, A-7, A-4	0	0	100	100	94-100	88-100	31-47	10-21
	25-60	Silty clay loam, silt loam	CL, CH	A-7, A-6	0	0	100	100	88-100	84-100	39-60	14-27
431B:												
Judson----------	0-9	Silty clay loam, silt loam	CL, ML	A-7, A-6	0	0	100	100	95-100	91-99	39-50	16-22
	9-22	Silty clay loam, silt loam	CL	A-7	0	0	100	100	94-100	92-100	38-49	16-23
	22-28	Silty clay loam	ML, CL	A-7	0	0	100	100	97-100	93-98	43-51	18-22
	28-35	Silty clay loam	CL	A-7	0	0	100	100	97-100	94-99	41-51	21-25
	35-52	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	93-100	89-96	36-45	17-23
	52-60	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	92-99	35-45	17-23
Ackmore, rarely flooded--------	0-6	Silt loam, silty clay loam	ML, CL	A-6, A-7, A-4	0	0	100	100	95-100	90-100	31-47	10-21
	6-25	Silt loam, silty clay loam	ML, CL	A-6, A-7, A-4	0	0	100	100	94-100	88-100	31-47	10-21
	25-60	Silty clay loam, silt loam	CL, CH	A-7, A-6	0	0	100	100	88-100	84-100	39-60	14-27
Colo, frequently flooded, overwash-------	0-7	Silt loam	CL	A-6	0	0	100	100	96-100	90-100	37-51	13-21
	7-15	Silt loam	CL	A-6	0	0	100	100	96-100	90-100	37-51	13-21
	15-50	Silty clay loam	CL, CH	A-7	0	0	100	100	97-100	93-98	45-53	21-25
	50-70	Silty clay loam	CL	A-7	0	0	100	100	97-100	93-98	41-49	21-25
	70-80	Silty clay loam	CL	A-7	0	0	100	100	97-100	93-98	39-47	21-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
435:												
Zook, occasionally flooded--------	0-7	Silty clay loam, silty clay	CH	A-7	0	0	100	100	98-100	93-100	51-68	22-32
	7-20	Silty clay loam, silty clay	CH	A-7	0	0	100	100	94-100	90-100	51-68	22-32
	20-38	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	90-100	86-99	49-65	23-32
	38-61	Silty clay loam, silty clay	CH	A-7	0	0	100	100	96-100	92-100	50-63	26-32
	61-80	Silty clay loam, silty clay, silt loam	CL, CH	A-7, A-6	0	0	100	100	87-100	83-100	31-56	13-32
Mt. Sterling, occasionally flooded--------	0-7	Silt loam	ML	A-6, A-7	0	0	100	100	95-100	89-98	29-43	12-18
	7-26	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	94-100	88-100	28-41	12-21
	26-54	Silty clay loam, silty clay	CH	A-7	0	0	100	100	95-100	91-100	45-57	25-33
	54-80	Silty clay, silty clay loam	CL	A-7	0	0	100	100	93-100	89-100	45-60	25-35
469C2:												
Lamoni, moderately eroded---------	0-6	Silty clay loam, clay loam	CL	A-7	0	0	94-100	89-100	82-100	74-97	41-56	19-28
	6-23	Clay, clay loam	CH	A-7	0	0	95-100	89-100	69-100	62-94	42-68	21-40
	23-55	Clay loam	CL	A-7, A-6	0	0	95-100	90-100	80-96	64-79	39-49	21-27
	55-80	Clay loam	CL	A-7, A-6	0	0	95-100	91-100	80-96	64-79	39-49	21-27
Clarinda, moderately eroded---------	0-6	Silty clay loam	CL	A-7	0	0	100	94-100	87-100	84-100	39-56	17-28
	6-80	Silty clay, clay	CH	A-7	0	0	94-100	89-100	79-100	75-100	51-71	29-44
Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
469C3: Lamoni, severely eroded	0-7	Clay loam, silty clay loam	CL	A-6, A-7	0	0	95-100	90-100	78-100	65-86	40-55	19-28
	7-14	Clay, clay loam	CH	A-7	0	0	95-100	89-100	67-100	58-90	41-66	21-40
	14-48	Clay loam	CL	A-7, A-6	0	0	95-100	90-100	80-96	64-79	39-49	21-27
	48-60	Clay loam	CL	A-7, A-6	0	0	95-100	91-100	80-96	64-79	39-49	21-27
Clarinda, severely eroded	0-4	Silty clay, clay	CH	A-7	0	0	100	94-100	86-100	82-100	53-69	29-40
	4-80	Silty clay, clay	CH	A-7	0	0	94-100	89-100	79-100	75-100	49-69	29-44
Shelby, severely eroded	0-2	Clay loam, loam	CL	A-6	0	0	95-100	83-100	70-96	55-77	36-50	16-25
	2-48	Clay loam	CL	A-6, A-7	0	0-5	90-95	81-95	71-91	56-73	39-50	21-27
	48-62	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	81-95	70-92	54-74	35-47	17-26
	62-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	55-74	35-47	17-26
470D2: Lamoni, moderately eroded---------	0-6	Silty clay loam, clay loam	CL	A-7	0	0	94-100	89-100	82-100	74-97	41-56	19-28
	6-23	Clay, clay loam	CH	A-7	0	0	95-100	89-100	69-100	62-94	42-68	21-40
	23-55	Clay loam	CL	A-7, A-6	0	0	95-100	90-100	80-96	64-79	39-49	21-27
	55-80	Clay loam	CL	A-7, A-6	0	0	95-100	91-100	80-96	64-79	39-49	21-27
Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26
509B: Marshall, terrace--------	0-7	Silty clay loam, silt loam	CL	A-7-6	0	0	100	100	93-100	92-100	41-53	17-25
	7-22	Silty clay loam	CL	A-7-6	0	0	100	100	94-100	92-100	41-52	18-25
	22-65	Silty clay loam	CL	A-6, A-7-6	0	0	100	100	96-100	95-100	36-48	18-25
	65-71	Silty clay loam, silt loam	CL	A-6, A-7-6	0	0	100	100	97-100	96-100	34-42	17-21
	71-80	Silty clay loam, silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	97-100	96-100	34-41	17-21

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
509C:												
Marshall, terrace	0-7	Silty clay loam, silt loam	CL	A-7-6	0	0	100	100	93-100	92-100	41-53	17-25
	7-22	Silty clay loam	CL	A-7-6	0	0	100	100	94-100	92-100	41-52	18-25
	22-65	Silty clay loam	CL	A-6, A-7-6	0	0	100	100	96-100	95-100	36-48	18-25
	65-71	Silty clay loam, silt loam	CL	A-6, A-7-6	0	0	100	100	97-100	96-100	34-42	17-21
	71-80	Silty clay loam, silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	97-100	96-100	34-41	17-21
509C2:												
Marshall, terrace, moderately eroded	0-6	Silty clay loam	CL	A-7, A-6	0	0	100	100	94-100	93-100	39-52	17-25
	6-60	Silty clay loam	CL	A-7, A-6	0	0	100	100	95-100	94-100	35-50	15-25
	60-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	94-100	93-100	35-50	15-25
545B:												
Zook	0-7	Silty clay loam, silty clay	CH	A-7	0	0	100	100	98-100	93-100	51-68	22-32
	7-20	Silty clay loam, silty clay	CH	A-7	0	0	100	100	94-100	90-100	51-68	22-32
	20-38	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	90-100	86-99	49-65	23-32
	38-61	Silty clay loam, silty clay	CH	A-7	0	0	100	100	96-100	92-100	50-63	26-32
	61-80	Silty clay loam, silty clay, silt loam	CL, CH	A-7, A-6	0	0	100	100	87-100	83-100	31-56	13-32
Ely	0-8	Silty clay loam, silt loam	CL	A-7	0	0	100	100	90-100	84-99	39-56	13-24
	8-32	Silty clay loam	CL	A-7	0	0	100	100	94-100	88-96	45-55	18-25
	32-58	Silty clay loam	CL	A-7, A-6	0	0	100	100	94-100	88-96	39-51	19-25
	58-80	Silty clay loam, silt loam	CL	A-6	0	0	100	100	89-100	83-100	30-47	12-25
Gullied land.												

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
733: Calco, occasionally flooded	0-8	Silty clay loam	CL	A-7	0	0	100	100	96-100	92-97	48-58	19-23
	8-50	Silty clay loam	CL	A-7	0	0	100	100	96-100	92-97	46-54	19-23
	50-65	Silty clay loam	CL	A-7	0	0	100	100	97-100	94-99	43-53	21-25
	65-79	Silty clay loam, silt loam	CL	A-6	0	0	100	100	94-100	89-99	34-47	15-23
803: Melia, terrace	0-7	Silty clay loam, silt loam	CL	A-7-6	0	0	100	100	90-100	89-100	38-54	13-25
	7-39	Silty clay loam, silt loam	CL	A-6, A-7-6	0	0	100	100	90-100	89-100	35-52	13-25
	39-76	Silty clay loam, silt loam	CL	A-6, A-7-6	0	0	100	100	90-100	89-100	30-48	13-25
	76-80	Silt loam	CL	A-6, A-7-6	0	0	100	100	94-100	92-100	28-42	12-21
824E3: Shelby, severely eroded	0-2	Clay loam, loam	CL	A-6	0	0	95-100	83-100	70-96	55-77	36-50	16-25
	2-48	Clay loam	CL	A-6, A-7	0	0-4	90-95	81-95	71-91	56-73	39-50	21-27
	48-62	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	81-95	70-92	54-74	35-47	17-26
	62-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	55-74	35-47	17-26
Lamoni, severely eroded	0-7	Clay loam, silty clay loam	CL	A-6, A-7	0	0	95-100	90-100	78-100	65-86	40-55	19-28
	7-14	Clay, clay loam	CH	A-7	0	0	95-100	89-100	67-100	58-90	41-66	21-40
	14-48	Clay loam	CL	A-7, A-6	0	0	95-100	90-100	80-96	64-79	39-49	21-27
	48-60	Clay loam	CL	A-7, A-6	0	0	95-100	91-100	80-96	64-79	39-49	21-27
870B: Sharpsburg, terrace	0-8	Silty clay loam	CL, CH	A-7	0	0	100	100	95-100	94-100	43-53	18-24
	8-17	Silty clay loam	CL, CH	A-7	0	0	100	100	97-100	95-99	43-50	21-24
	17-38	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	96-100	95-100	48-57	26-30
	38-60	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	95-100	93-100	35-47	17-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
1239:												
Corley, terrace	0-10	Silt loam	CL	A-6, A-7	0	0	100	100	100	95-100	30-45	15-25
	10-18	Silt loam			0	0	100	100	100	95-100	37-47	13-19
	18-29	Silt loam			0	0	100	100	100	95-100	33-39	13-17
	29-60	Silty clay loam, silt loam	CL, CH	A-7, A-6	0	0	100	100	100	95-100	35-55	20-30
	60-68	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	30-45	15-25
Minden, terrace	0-7	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
	7-22	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
	22-66	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	20-25
	66-80	Silt loam	ML, CL	A-7, A-6	0	0	100	100	100	95-100	35-50	10-25
2428:												
Ely-------------	0-8	Silty clay loam, silt loam	CL	A-7	0	0	100	100	90-100	84-99	39-56	13-24
	8-32	Silty clay loam	CL	A-7	0	0	100	100	94-100	88-96	45-55	18-25
	32-58	Silty clay loam	CL	A-7, A-6	0	0	100	100	94-100	88-96	39-51	19-25
	58-80	Silty clay loam, silt loam	CL	A-6	0	0	100	100	94-100	88-96	30-47	12-25
Colo, overwash--	0-7	Silt loam	CL	A-6	0	0	100	100	96-100	90-100	37-51	13-21
	7-15	Silt loam	CL	A-6	0	0	100	100	96-100	90-100	37-51	13-21
	15-50	Silty clay loam	CL, CH	A-7	0	0	100	100	97-100	93-98	45-53	21-25
	50-70	Silty clay loam	CL	A-7	0	0	100	100	97-100	93-98	41-49	21-25
	70-80	Silty clay loam	CL	A-7	0	0	100	100	97-100	93-98	39-47	21-25
Mt. Sterling----	0-7	Silt loam	ML	A-6, A-7	0	0	100	100	95-100	89-98	29-43	12-18
	7-26	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	94-100	88-100	28-41	12-21
	26-54	Silty clay loam, silty clay	CH	A-7	0	0	100	100	95-100	91-100	45-57	25-33
	54-80	Silty clay, silty clay loam	CL	A-7	0	0	100	100	93-100	89-100	45-60	25-35
4946C.												
Udorthents-Interstate highway												
5030.												
Pits, limestone quarry												

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
5040. Udorthents, loamy												
5080. Udorthents, sanitary landfill												
AW. Animal waste lagoon												
SL. Sewage lagoon												
W. Water												
Y8B: Judson----------	0-9	Silty clay loam, silt loam	CL, ML	A-7, A-6	0	0	100	100	95-100	91-99	39-50	16-22
	9-22	Silty clay loam, silt loam	CL	A-7	0	0	100	100	94-100	92-100	38-49	16-23
	22-28	Silty clay loam	ML, CL	A-7	0	0	100	100	97-100	93-98	43-51	18-22
	28-35	Silty clay loam	CL	A-7	0	0	100	100	97-100	94-99	41-51	21-25
	35-52	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	93-100	89-96	36-45	17-23
	52-60	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	92-99	35-45	17-23
Y8C: Judson----------	0-9	Silty clay loam, silt loam	CL, ML	A-7, A-6	0	0	100	100	95-100	91-99	39-50	16-22
	9-22	Silty clay loam, silt loam	CL	A-7	0	0	100	100	94-100	92-100	38-49	16-23
	22-28	Silty clay loam	ML, CL	A-7	0	0	100	100	97-100	93-98	43-51	18-22
	28-35	Silty clay loam	CL	A-7	0	0	100	100	97-100	94-99	41-51	21-25
	35-52	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	93-100	89-96	36-45	17-23
	52-60	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	92-99	35-45	17-23

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Y24C2: Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26
Y24D2: Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26
Y24D3: Shelby, severely eroded	0-2	Clay loam, loam	CL	A-6	0	0	95-100	83-100	70-96	55-77	36-50	16-25
	2-48	Clay loam	CL	A-6, A-7	0	0-4	90-95	81-95	71-91	56-73	39-50	21-27
	48-62	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	81-95	70-92	54-74	35-47	17-26
	62-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	55-74	35-47	17-26
Y24E: Shelby----------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	71-97	54-77	40-53	16-25
	7-11	Clay loam	CL	A-6, A-7	0	0-4	90-95	79-95	68-91	53-73	38-51	16-25
	11-46	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	70-91	55-73	40-51	21-27
	46-60	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	71-93	55-75	35-47	17-26
	60-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	71-93	55-75	35-47	17-26
Y24E2: Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26
Y24E3: Shelby, severely eroded	0-2	Clay loam, loam	CL	A-6	0	0	95-100	83-100	70-96	55-77	36-50	16-25
	2-48	Clay loam	CL	A-6, A-7	0	0-4	90-95	81-95	71-91	56-73	39-50	21-27
	48-62	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	81-95	70-92	54-74	35-47	17-26
	62-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	55-74	35-47	17-26

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Y24F2:												
Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26
Y24F3:												
Shelby, severely eroded	0-2	Clay loam, loam	CL	A-6	0	0	95-100	83-100	70-96	55-77	36-50	16-25
	2-48	Clay loam	CL	A-6, A-7	0	0-4	90-95	81-95	71-91	56-73	39-50	21-27
	48-62	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	81-95	70-92	54-74	35-47	17-26
	62-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	55-74	35-47	17-26
Y82C3:												
Adair, severely eroded---------	0-3	Clay loam, silty clay loam	CL	A-7	0	0	100	100	86-100	73-89	38-55	16-28
	3-26	Clay, silty clay, clay loam	CH, CL	A-7	0	0	95-100	76-100	61-100	51-89	49-70	27-44
	26-59	Clay loam	CL	A-7, A-6	0	0	95-100	78-100	70-98	59-83	39-49	21-27
	59-70	Clay loam	CL	A-7, A-6	0	0	95-100	79-100	69-96	54-77	39-49	21-27
	70-80	Clay loam	CL	A-7, A-6	0	0	96-100	79-100	70-96	55-77	39-49	21-27
Shelby, severely eroded	0-2	Clay loam, loam	CL	A-6	0	0	95-100	83-100	70-96	55-77	36-50	16-25
	2-48	Clay loam	CL	A-6, A-7	0	0-5	90-95	81-95	71-91	56-73	39-50	21-27
	48-62	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	81-95	70-92	54-74	35-47	17-26
	62-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	55-74	35-47	17-26
Y93D2:												
Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Y93D2:												
Adair, moderately eroded---------	0-7	Clay loam, silty clay loam	CL	A-7	0	0	100	100	86-100	73-89	39-55	16-28
	7-17	Clay, silty clay, clay loam	CH, CL	A-7	0	0	95-100	76-100	61-100	51-89	49-72	27-44
	17-60	Clay loam	CL	A-7, A-6	0	0	95-100	78-100	70-98	59-83	39-49	21-27
	60-76	Clay loam	CL	A-7, A-6	0	0	95-100	79-100	69-96	54-77	39-49	21-27
	76-80	Clay loam	CL	A-7, A-6	0	0	96-100	79-100	70-96	55-77	39-49	21-27
Y93D3:												
Shelby, severely eroded	0-2	Clay loam, loam	CL	A-6	0	0	95-100	83-100	70-96	55-77	36-50	16-25
	2-48	Clay loam	CL	A-6, A-7	0	0-4	90-95	81-95	71-91	56-73	39-50	21-27
	48-62	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	81-95	70-92	54-74	35-47	17-26
	62-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	55-74	35-47	17-26
Adair, severely eroded---------	0-3	Clay loam, silty clay loam	CL	A-7	0	0	100	100	86-100	73-89	38-55	16-28
	3-26	Clay, silty clay, clay loam	CH, CL	A-7	0	0	95-100	76-100	61-100	51-89	49-70	27-44
	26-59	Clay loam	CL	A-7, A-6	0	0	95-100	78-100	70-98	59-83	39-49	21-27
	59-70	Clay loam	CL	A-7, A-6	0	0	95-100	79-100	69-96	54-77	39-49	21-27
	70-80	Clay loam	CL	A-7, A-6	0	0	96-100	79-100	70-96	55-77	39-49	21-27
Y93E2:												
Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26
Adair, moderately eroded---------	0-7	Clay loam, silty clay loam	CL	A-7	0	0	100	100	86-100	73-89	39-55	16-28
	7-17	Clay, silty clay, clay loam	CH, CL	A-7	0	0	95-100	76-100	61-100	51-89	49-72	27-44
	17-60	Clay loam	CL	A-7, A-6	0	0	95-100	78-100	70-98	59-83	39-49	21-27
	60-76	Clay loam	CL	A-7, A-6	0	0	95-100	79-100	69-96	54-77	39-49	21-27
	76-80	Clay loam	CL	A-7, A-6	0	0	96-100	79-100	70-96	55-77	39-49	21-27

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Y192C2: Adair, moderately eroded	0-7	Clay loam, silty clay loam	CL	A-7	0	0	100	100	86-100	73-89	39-56	16-28
	7-17	Clay, silty clay, clay loam	CL, CH	A-7	0	0	95-100	76-100	61-100	51-89	49-73	27-45
	17-60	Clay loam	CL	A-7, A-6	0	0	95-100	78-100	70-98	59-83	40-49	21-27
	60-76	Clay loam	CL	A-7, A-6	0	0	95-100	79-100	69-96	54-77	40-49	21-27
	76-80	Clay loam	CL	A-7, A-6	0	0	96-100	79-100	70-96	55-77	40-49	21-27
Y192D2: Adair, moderately eroded	0-7	Clay loam, silty clay loam	CL	A-7	0	0	100	100	86-100	73-89	39-55	16-28
	7-17	Clay, silty clay, clay loam	CH, CL	A-7	0	0	95-100	76-100	61-100	51-89	49-72	27-44
	17-60	Clay loam	CL	A-7, A-6	0	0	95-100	78-100	70-98	59-83	39-49	21-27
	60-76	Clay loam	CL	A-7, A-6	0	0	95-100	79-100	69-96	54-77	39-49	21-27
	76-80	Clay loam	CL	A-7, A-6	0	0	96-100	79-100	70-96	55-77	39-49	21-27
Y222C2: Clarinda, moderately eroded	0-6	Silty clay loam	CL	A-7	0	0	100	94-100	87-100	84-100	39-56	17-28
	6-80	Silty clay, clay	CH	A-7	0	0	94-100	89-100	79-100	75-100	51-71	29-44
Y222D2: Clarinda, moderately eroded	0-6	Silty clay loam	CL	A-7	0	0	100	94-100	87-100	84-100	39-56	17-28
	6-80	Silty clay, clay	CH	A-7	0	0	94-100	89-100	79-100	75-100	51-71	29-44
Y222D3: Clarinda, severely eroded	0-4	Silty clay, clay	CH	A-7	0	0	100	94-100	86-100	82-100	53-69	29-40
	4-80	Silty clay, clay	CH	A-7	0	0	94-100	89-100	79-100	75-100	49-69	29-44

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Z8B:												
Judson----------	0-9	Silty clay loam, silt loam	CL, ML	A-7, A-6	0	0	100	100	95-100	91-99	39-50	16-22
	9-22	Silty clay loam, silt loam	CL	A-7	0	0	100	100	94-100	92-100	38-49	16-23
	22-28	Silty clay loam	ML, CL	A-7	0	0	100	100	97-100	93-98	43-51	18-22
	28-35	Silty clay loam	CL	A-7	0	0	100	100	97-100	94-99	41-51	21-25
	35-52	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	93-100	89-96	36-45	17-23
	52-60	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	92-99	35-45	17-23
Z8C:												
Judson----------	0-9	Silty clay loam, silt loam	CL, ML	A-7, A-6	0	0	100	100	95-100	91-99	39-50	16-22
	9-22	Silty clay loam, silt loam	CL	A-7	0	0	100	100	94-100	92-100	38-49	16-23
	22-28	Silty clay loam	ML, CL	A-7	0	0	100	100	97-100	93-98	43-51	18-22
	28-35	Silty clay loam	CL	A-7	0	0	100	100	97-100	94-99	41-51	21-25
	35-52	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	93-100	89-96	36-45	17-23
	52-60	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	92-99	35-45	17-23
Z24D2:												
Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26
Z24D3:												
Shelby, severely eroded	0-2	Clay loam, loam	CL	A-6	0	0	95-100	83-100	70-96	55-77	36-50	16-25
	2-48	Clay loam	CL	A-6, A-7	0	0-4	90-95	81-95	71-91	56-73	39-50	21-27
	48-62	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	81-95	70-92	54-74	35-47	17-26
	62-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	55-74	35-47	17-26

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Z24E2:												
Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26
Z24E3:												
Shelby, severely eroded	0-2	Clay loam, loam	CL	A-6	0	0	95-100	83-100	70-96	55-77	36-50	16-25
	2-48	Clay loam	CL	A-6, A-7	0	0-4	90-95	81-95	71-91	56-73	39-50	21-27
	48-62	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	81-95	70-92	54-74	35-47	17-26
	62-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	55-74	35-47	17-26
Z24F2:												
Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26
Z82D3:												
Adair, severely eroded---------	0-3	Clay loam, silty clay loam	CL	A-7	0	0	100	100	86-100	73-89	38-55	16-28
	3-26	Clay, silty clay, clay loam	CH, CL	A-7	0	0	95-100	76-100	61-100	51-89	49-70	27-44
	26-59	Clay loam	CL	A-7, A-6	0	0	95-100	78-100	70-98	59-83	39-49	21-27
	59-70	Clay loam	CL	A-7, A-6	0	0	95-100	79-100	69-96	54-77	39-49	21-27
	70-80	Clay loam	CL	A-7, A-6	0	0	96-100	79-100	70-96	55-77	39-49	21-27
Shelby, severely eroded	0-2	Clay loam, loam	CL	A-6	0	0	95-100	83-100	70-96	55-77	36-50	16-25
	2-48	Clay loam	CL	A-6, A-7	0	0-4	90-95	81-95	71-91	56-73	39-50	21-27
	48-62	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	81-95	70-92	54-74	35-47	17-26
	62-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	55-74	35-47	17-26

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Z93C2:												
Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26
Adair, moderately eroded---------	0-7	Clay loam, silty clay loam	CL	A-7	0	0	100	100	86-100	73-89	39-55	16-28
	7-17	Clay, silty clay, clay loam	CH, CL	A-7	0	0	95-100	76-100	61-100	51-89	49-72	27-44
	17-60	Clay loam	CL	A-7, A-6	0	0	95-100	78-100	70-98	59-83	39-49	21-27
	60-76	Clay loam	CL	A-7, A-6	0	0	95-100	79-100	69-96	54-77	39-49	21-27
	76-80	Clay loam	CL	A-7, A-6	0	0	96-100	79-100	70-96	55-77	39-49	21-27
Z93D2:												
Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26
Adair, moderately eroded---------	0-7	Clay loam, silty clay loam	CL	A-7	0	0	100	100	86-100	73-89	39-55	16-28
	7-17	Clay, silty clay, clay loam	CH, CL	A-7	0	0	95-100	76-100	61-100	51-89	49-72	27-44
	17-60	Clay loam	CL	A-7, A-6	0	0	95-100	78-100	70-98	59-83	39-49	21-27
	60-76	Clay loam	CL	A-7, A-6	0	0	95-100	79-100	69-96	54-77	39-49	21-27
	76-80	Clay loam	CL	A-7, A-6	0	0	96-100	79-100	70-96	55-77	39-49	21-27
Z93E2:												
Shelby, moderately eroded---------	0-7	Clay loam, loam	CL	A-6	0	0	95-100	82-100	70-97	54-77	39-52	16-25
	7-37	Clay loam	CL	A-6, A-7	0	0-4	90-95	80-95	71-92	55-73	40-51	21-27
	37-45	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	70-92	54-73	35-47	17-26
	45-80	Clay loam, loam	CL	A-6, A-7	0	0-4	91-95	82-95	72-94	55-75	35-47	17-26

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Z93E2: Adair, moderately eroded---------	0-7	Clay loam, silty clay loam	CL	A-7	0	0	100	100	86-100	73-89	39-55	16-28
	7-17	Clay, silty clay, clay loam	CH, CL	A-7	0	0	95-100	76-100	61-100	51-89	49-72	27-44
	17-60	Clay loam	CL	A-7, A-6	0	0	95-100	78-100	70-98	59-83	39-49	21-27
	60-76	Clay loam	CL	A-7, A-6	0	0	95-100	79-100	69-96	54-77	39-49	21-27
	76-80	Clay loam	CL	A-7, A-6	0	0	96-100	79-100	70-96	55-77	39-49	21-27
Z192C3: Adair, severely eroded---------	0-3	Clay loam, silty clay loam	CL	A-7	0	0	100	100	86-100	73-89	38-55	16-28
	3-26	Clay, silty clay, clay loam	CH, CL	A-7	0	0	95-100	76-100	61-100	51-89	49-70	27-44
	26-59	Clay loam	CL	A-7, A-6	0	0	95-100	78-100	70-98	59-83	39-49	21-27
	59-70	Clay loam	CL	A-7, A-6	0	0	95-100	79-100	69-96	54-77	39-49	21-27
	70-80	Clay loam	CL	A-7, A-6	0	0	96-100	79-100	70-96	55-77	39-49	21-27
Z222D2: Clarinda, moderately eroded---------	0-6	Silty clay loam	CL	A-7	0	0	100	94-100	87-100	84-100	39-56	17-28
	6-80	Silty clay, clay	CH	A-7	0	0	94-100	89-100	79-100	75-100	51-71	29-44

Physical Properties

The table described in this section shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In the table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In the table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In the table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33-kPa or 10-kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity (Ksat). The estimates in the table indicate the rate of water movement, in micrometers per second, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33-kPa or 10-kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the “National Soil Survey Handbook,” which is available in local offices of the Natural Resources Conservation Service or on the Internet.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Physical Properties of the Soils

(The percentages in the sand and clay columns are shown as low, representative value, and high. The percentages in the silt column are shown as a representative value. Representative values are indicative of conditions that occur most commonly. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
7:														
Wiota, rarely flooded	0-8	1- 8- 14	65	20-27- 32	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	3.5-4.5	.32	.32	5	6	48
	8-28	1- 8- 14	65	20-27- 32	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	3.0-4.0	.37	.37			
	28-59	1- 8- 14	60	30-33- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	1.0-2.0	.43	.43			
	59-80	1- 8- 14	66	25-27- 34	1.40-1.50	1.00-10.00	0.20-0.22	3.0-5.9	0.0-1.0	.49	.49			
7B:														
Wiota, rarely flooded	0-8	1- 8- 14	65	20-27- 32	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	3.5-4.5	.32	.32	5	6	48
	8-28	1- 8- 14	65	20-27- 32	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	3.0-4.0	.37	.37			
	28-59	1- 8- 14	60	30-33- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	1.0-2.0	.43	.43			
	59-80	1- 8- 14	66	25-27- 34	1.40-1.50	1.00-10.00	0.20-0.22	3.0-5.9	0.0-1.0	.49	.49			
9:														
Marshall-------------	0-7	1- 3- 10	66	25-31- 35	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	3.0-4.0	.28	.28	5	6	48
	7-22	1- 3- 10	64	27-33- 35	1.20-1.30	1.00-10.00	0.20-0.23	3.0-5.9	2.5-3.5	.28	.28			
	22-65	1- 3- 10	67	27-30- 35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.5	.43	.43			
	65-71	1- 3- 10	70	25-27- 30	1.25-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.3-1.0	.49	.49			
	71-80	1- 3- 10	70	25-27- 30	1.25-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
9B:														
Marshall-------------	0-7	1- 3- 10	66	25-31- 35	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	3.0-4.0	.28	.28	5	6	48
	7-22	1- 3- 10	64	27-33- 35	1.20-1.30	1.00-10.00	0.20-0.23	3.0-5.9	2.5-3.5	.28	.28			
	22-65	1- 3- 10	67	27-30- 35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.5	.43	.43			
	65-71	1- 3- 10	70	25-27- 30	1.25-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.3-1.0	.49	.49			
	71-80	1- 3- 10	70	25-27- 30	1.25-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
9C2:														
Marshall, moderately eroded--------------	0-7	1- 4- 10	65	27-32- 35	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	5	6	48
	7-50	1- 4- 10	67	27-30- 35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	50-62	1- 4- 10	69	25-28- 35	1.30-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.3-0.5	.49	.49			
	62-80	1- 3- 10	70	25-28- 35	1.30-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
9C3:														
Marshall, severely eroded--------------	0-5	1- 3- 10	68	27-30- 35	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	1.2-2.2	.43	.43	4	6	48
	5-41	1- 3- 10	68	27-29- 35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.49	.49			
	41-50	1- 3- 10	70	25-28- 35	1.30-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
	50-80	1- 3- 10	70	25-28- 35	1.30-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.49	.49			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
9D2:														
Marshall, moderately eroded	0-7	1- 4- 10	65	27-32- 35	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	5	6	48
	7-50	1- 4- 10	67	27-30- 35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	50-62	1- 4- 10	69	25-28- 35	1.30-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.3-0.5	.49	.49			
	62-80	1- 3- 10	70	25-28- 35	1.30-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
15B:														
Olmitz	0-7	20-40- 50	35	24-26- 27	1.50-1.55	1.00-10.00	0.20-0.22	3.0-5.9	3.0-4.0	.20	.20	5	6	48
	7-30	20-35- 50	37	22-28- 34	1.40-1.50	1.00-10.00	0.15-0.17	3.0-5.9	2.0-3.0	.28	.28			
	30-60	20-35- 50	35	27-31- 34	1.45-1.55	1.00-10.00	0.14-0.16	3.0-5.9	1.0-2.0	.28	.28			
Ely	0-8	5-10- 20	62	20-28- 35	1.30-1.60	1.00-10.00	0.21-0.23	0.0-2.9	5.0-6.0	.32	.32	5	6	48
	8-32	5-10- 20	59	27-31- 35	1.30-1.55	1.00-10.00	0.21-0.23	3.0-5.9	4.0-5.0	.24	.24			
	32-58	5-10- 20	59	27-31- 35	1.30-1.55	1.00-10.00	0.18-0.20	3.0-5.9	1.0-3.0	.37	.37			
	58-80	5-10- 20	63	18-27- 35	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.49	.49			
Zook	0-7	1- 8- 14	59	32-34- 45	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	5.0-7.0	.32	.32	5	6	48
	7-20	1- 8- 14	57	32-36- 45	1.30-1.35	0.10-1.00	0.21-0.23	3.0-5.9	5.0-7.0	.32	.32			
	20-38	1- 8- 14	52	32-41- 45	1.30-1.45	0.01-0.10	0.11-0.13	6.0-8.9	3.0-5.0	.32	.32			
	38-61	1- 8- 14	55	36-38- 45	1.30-1.45	0.10-1.00	0.18-0.20	6.0-8.9	2.0-4.0	.32	.32			
	61-80	1- 8- 14	60	20-33- 45	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
16:														
Nodaway, occasionally flooded	0-7	1- 8- 14	67	18-26- 35	1.40-1.50	1.00-10.00	0.22-0.24	3.0-5.9	1.5-2.5	.37	.37	5	6	48
	7-80	1- 7- 14	67	18-26- 35	1.40-1.50	1.00-10.00	0.20-0.22	3.0-5.9	0.0-0.5	.49	.49			
Kennebec, occasionally flooded	0-8	1- 6- 10	70	18-25- 27	1.45-1.60	1.00-10.00	0.22-0.24	3.0-5.9	4.0-6.0	.28	.28	5	6	48
	8-54	1- 6- 10	70	18-25- 27	1.45-1.60	1.00-10.00	0.20-0.22	3.0-5.9	2.0-4.0	.37	.37			
	54-80	1- 8- 15	66	24-26- 27	1.45-1.60	1.00-10.00	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			
43:														
Bremer, rarely flooded	0-8	1- 8- 14	61	27-32- 36	1.30-1.35	1.00-10.00	0.21-0.23	0.0-2.9	5.0-7.0	.37	.37	5	6	48
	8-19	1- 8- 14	61	27-32- 36	1.30-1.35	1.00-10.00	0.21-0.23	0.0-2.9	5.0-7.0	.37	.37			
	19-42	1- 8- 14	53	35-40- 45	1.30-1.45	0.10-1.00	0.18-0.20	6.0-8.9	1.0-2.0	.37	.37			
	42-50	1- 8- 14	58	30-35- 40	1.30-1.40	0.10-1.00	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	50-60	10-15- 40	52	25-34- 40	1.40-1.50	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
54:														
Zook, occasionally flooded	0-7	1- 8- 14	59	32-34- 45	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	5.0-7.0	.32	.32	5	6	48
	7-20	1- 8- 14	57	32-36- 45	1.30-1.35	0.10-1.00	0.21-0.23	3.0-5.9	5.0-7.0	.32	.32			
	20-38	1- 8- 14	52	32-41- 45	1.30-1.45	0.01-0.10	0.11-0.13	6.0-8.9	3.0-5.0	.32	.32			
	38-61	1- 8- 14	55	36-38- 45	1.30-1.45	0.10-1.00	0.18-0.20	6.0-8.9	2.0-4.0	.32	.32			
	61-80	1- 8- 14	60	20-33- 45	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
54+:														
Zook, occasionally flooded, overwash	0-7	5-13- 20	65	20-23- 26	1.45-1.55	1.00-10.00	0.22-0.24	3.0-5.9	2.0-4.0	.43	.43	5	6	48
	7-13	5-13- 20	65	20-23- 26	1.45-1.50	1.00-10.00	0.22-0.24	3.0-5.9	2.0-4.0	.43	.43			
	13-50	1- 8- 14	55	32-38- 45	1.30-1.45	0.10-1.00	0.21-0.23	6.0-8.9	3.0-5.0	.32	.32			
	50-58	1- 8- 14	55	36-38- 45	1.30-1.45	0.10-1.00	0.18-0.20	6.0-8.9	2.0-4.0	.32	.32			
	58-80	1- 8- 14	60	20-33- 45	1.30-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
88:														
Nevin, rarely flooded	0-8	5- 7- 15	65	26-28- 29	1.30-1.40	1.00-10.00	0.22-0.24	0.0-2.9	4.0-6.0	.28	.28	5	6	48
	8-24	5- 7- 15	66	26-28- 29	1.25-1.35	1.00-10.00	0.21-0.23	3.0-5.9	4.0-6.0	.28	.28			
	24-46	5- 8- 15	59	30-33- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	1.0-2.0	.37	.37			
	46-62	5- 9- 15	62	25-29- 36	1.40-1.50	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
99D2:														
Exira, moderately eroded	0-6	1- 2- 10	68	28-30- 34	1.25-1.35	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	5	6	48
	6-33	1- 2- 10	71	25-27- 35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.49	.49			
	33-37	1- 2- 10	73	25-25- 35	1.25-1.35	1.00-10.00	0.20-0.22	3.0-5.9	0.0-0.5	.49	.49			
	37-80	1- 3- 10	72	20-25- 30	1.30-1.35	1.00-10.00	0.20-0.22	3.0-5.9	0.0-0.5	.49	.49			
99D3:														
Exira, severely eroded	0-5	1- 3- 10	66	28-31- 34	1.25-1.35	1.00-10.00	0.21-0.23	3.0-5.9	1.2-2.2	.43	.43	4	6	48
	5-36	1- 3- 10	70	25-27- 35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.3-0.5	.49	.49			
	36-44	1- 3- 10	71	25-26- 35	1.25-1.35	1.00-10.00	0.20-0.22	3.0-5.9	0.0-0.5	.49	.49			
	44-80	1- 3- 10	73	20-24- 30	1.30-1.35	1.00-10.00	0.20-0.22	3.0-5.9	0.0-0.5	.49	.49			
99E2:														
Exira, moderately eroded	0-6	1- 2- 10	68	28-30- 34	1.25-1.35	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	5	6	48
	6-33	1- 2- 10	71	25-27- 35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.49	.49			
	33-37	1- 2- 10	73	25-25- 35	1.25-1.35	1.00-10.00	0.20-0.22	3.0-5.9	0.0-0.5	.49	.49			
	37-80	1- 3- 10	72	20-25- 30	1.30-1.35	1.00-10.00	0.20-0.22	3.0-5.9	0.0-0.5	.49	.49			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
99E3:														
Exira, severely eroded	0-5	1- 3- 10	66	28-31- 34	1.25-1.35	1.00-10.00	0.21-0.23	3.0-5.9	1.2-2.2	.43	.43	4	6	48
	5-36	1- 3- 10	70	25-27- 35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.3-0.5	.49	.49			
	36-44	1- 3- 10	71	25-26- 35	1.25-1.35	1.00-10.00	0.20-0.22	3.0-5.9	0.0-0.5	.49	.49			
	44-80	1- 3- 10	73	20-24- 30	1.30-1.35	1.00-10.00	0.20-0.22	3.0-5.9	0.0-0.5	.49	.49			
113B:														
Colo, frequently flooded, overwash	0-7	2-10- 25	67	20-24- 30	1.25-1.30	1.00-10.00	0.22-0.24	3.0-5.9	3.0-5.0	.32	.32	5	6	48
	7-15	2-10- 25	67	20-24- 30	1.25-1.30	1.00-10.00	0.22-0.24	3.0-5.9	3.0-5.0	.32	.32			
	15-50	1- 7- 15	61	30-33- 35	1.25-1.35	1.00-10.00	0.18-0.20	3.0-5.9	3.0-4.0	.28	.28			
	50-70	1- 7- 15	61	30-33- 35	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	1.0-2.0	.43	.43			
	70-80	5- 7- 30	61	30-33- 35	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
Ely	0-8	5-10- 20	62	20-28- 35	1.30-1.60	1.00-10.00	0.21-0.23	0.0-2.9	5.0-6.0	.32	.32	5	6	48
	8-32	5-10- 20	59	27-31- 35	1.30-1.55	1.00-10.00	0.21-0.23	3.0-5.9	4.0-5.0	.24	.24			
	32-58	5-10- 20	59	27-31- 35	1.30-1.55	1.00-10.00	0.18-0.20	3.0-5.9	1.0-3.0	.37	.37			
	58-80	5-10- 20	63	18-27- 35	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.49	.49			
136:														
Ankeny, occasionally flooded	0-7	55-65- 75	21	10-14- 18	1.50-1.70	10.00-40.00	0.16-0.18	0.0-2.9	2.5-3.5	.17	.17	4	3	86
	7-30	55-65- 75	21	10-14- 18	1.50-1.70	10.00-40.00	0.16-0.18	0.0-2.9	2.5-3.5	.17	.17			
	30-44	60-70- 80	17	10-13- 16	1.50-1.70	10.00-40.00	0.15-0.17	0.0-2.9	0.5-1.0	.24	.24			
	44-60	75-85- 95	10	2- 5- 8	1.55-1.70	40.00-100.00	0.08-0.10	0.0-2.9	0.0-0.5	.15	.15			
212:														
Kennebec, occasionally flooded	0-8	1- 6- 10	70	18-25- 27	1.45-1.60	1.00-10.00	0.22-0.24	3.0-5.9	4.0-6.0	.28	.28	5	6	48
	8-54	1- 6- 10	70	18-25- 27	1.45-1.60	1.00-10.00	0.20-0.22	3.0-5.9	2.0-4.0	.37	.37			
	54-80	1- 8- 15	66	24-26- 27	1.45-1.60	1.00-10.00	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			
220:														
Nodaway, occasionally flooded	0-7	1- 8- 14	67	18-26- 35	1.40-1.50	1.00-10.00	0.22-0.24	3.0-5.9	1.5-2.5	.37	.37	5	6	48
	7-80	1- 7- 14	67	18-26- 35	1.40-1.50	1.00-10.00	0.20-0.22	3.0-5.9	0.0-0.5	.49	.49			
229C2:														
Clarinda, moderately eroded	0-6	1- 5- 14	63	25-33- 40	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	3	6	48
	6-80	1- 8- 14	42	40-50- 60	1.30-1.40	0.01-0.10	0.08-0.12	9.0-11.9	0.0-0.5	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
229C2: Clarinda, severely eroded	0-4	1- 8- 14	45	40-48- 55	1.30-1.40	0.01-0.10	0.12-0.14	6.0-8.9	1.7-2.7	.28	.28	2	4	86
	4-80	1- 8- 14	43	40-50- 60	1.30-1.40	0.01-0.10	0.08-0.12	9.0-11.9	0.0-0.5	.32	.32			
229D2: Clarinda, moderately eroded	0-6	1- 5- 14	63	25-33- 40	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	3	6	48
	6-80	1- 8- 14	42	40-50- 60	1.30-1.40	0.01-0.10	0.08-0.12	9.0-11.9	0.0-0.5	.32	.32			
Clarinda, severely eroded	0-4	1- 8- 14	45	40-48- 55	1.30-1.40	0.01-0.10	0.12-0.14	6.0-8.9	1.7-2.7	.28	.28	2	4	86
	4-80	1- 8- 14	43	40-50- 60	1.30-1.40	0.01-0.10	0.08-0.12	9.0-11.9	0.0-0.5	.32	.32			
247D2: Shelby, sandy substratum, moderately eroded	0-5	20-33- 45	45	20-23- 26	1.45-1.55	1.00-10.00	0.20-0.22	3.0-5.9	2.2-3.2	.37	.37	5	6	48
	5-33	20-33- 45	34	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	33-51	20-33- 45	45	20-23- 26	1.55-1.65	1.00-10.00	0.17-0.19	3.0-5.9	0.0-0.5	.43	.43			
	51-80	52-65- 75	22	8-13- 18	1.60-1.70	10.00-100.00	0.14-0.19	3.0-5.9	0.0-0.5	.28	.28			
Hesch, deep, moderately eroded	0-7	20-33- 45	45	20-23- 26	1.45-1.55	1.00-10.00	0.20-0.22	3.0-5.9	2.2-3.2	.37	.37	5	6	48
	7-18	33-45- 63	37	10-18- 26	1.50-1.55	1.00-10.00	0.17-0.19	0.0-2.9	1.0-1.0	.37	.37			
	18-39	52-67- 78	19	10-14- 18	1.50-1.70	10.00-100.00	0.15-0.17	0.0-2.9	0.0-0.5	.28	.28			
	39-49	68-81- 92	14	2- 5- 8	1.55-1.70	10.00-100.00	0.08-0.10	0.0-2.9	0.0-0.5	.32	.32			
	49-80	--	--	1- 2- 2	---	---	---	---	---	---	---			
Hesch, moderately eroded	0-9	33-40- 45	40	10-20- 27	1.45-1.70	1.00-10.00	0.20-0.22	0.0-2.9	2.0-3.0	.32	.32	5	6	48
	9-17	20-33- 45	38	27-30- 35	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	17-28	75-84- 90	14	1- 3- 5	1.55-1.70	10.00-100.00	0.08-0.10	0.0-2.9	0.0-0.5	.24	.24			
	28-80	--	--	--	---	---	---	---	---	---	---			
269: Humeston, occasionally flooded, occasionally ponded	0-11	5-15- 20	58	24-27- 30	1.35-1.45	1.00-10.00	0.21-0.23	3.0-5.9	3.0-4.0	.32	.32	5	8	0
	11-25	5-15- 20	62	20-23- 26	1.45-1.55	1.00-10.00	0.22-0.24	3.0-5.9	1.0-2.0	.49	.49			
	25-31	5-13- 20	55	30-33- 35	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.5	.43	.43			
	31-72	5- 8- 10	54	35-39- 48	1.30-1.50	0.10-1.00	0.13-0.18	6.0-8.9	1.0-1.5	.37	.37			
	72-80	5-10- 20	56	30-34- 38	1.40-1.50	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
273B:														
Olmitz	0-7	20-40-50	35	24-26-27	1.50-1.55	1.00-10.00	0.20-0.22	3.0-5.9	3.0-4.0	.20	.20	5	6	48
	7-30	20-35-50	37	22-28-34	1.40-1.50	1.00-10.00	0.15-0.17	3.0-5.9	2.0-3.0	.32	.32			
	30-60	20-35-50	35	27-31-34	1.45-1.55	1.00-10.00	0.14-0.16	3.0-5.9	1.0-2.0	.32	.32			
289D2:														
Dickman, loamy substratum, moderately eroded	0-6	60-70-80	16	10-14-18	1.50-1.60	10.00-100.00	0.16-0.18	0.0-2.9	1.0-2.0	.24	.24	5	3	86
	6-19	60-70-80	16	10-14-18	1.50-1.60	10.00-100.00	0.15-0.17	0.0-2.9	0.0-1.0	.24	.24			
	19-46	80-88-95	6	4-7-10	1.55-1.65	10.00-100.00	0.09-0.11	0.0-2.9	0.0-0.5	.24	.24			
	46-56	60-70-80	16	10-14-18	1.55-1.65	10.00-100.00	0.14-0.16	0.0-2.9	0.0-0.5	.24	.24			
	56-69	80-90-95	3	4-7-10	1.60-1.70	100-705	0.05-0.07	0.0-2.9	0.0-0.5	.20	.20			
	69-80	1-3-5	71	25-26-35	1.30-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
Marshall, moderately eroded	0-7	1-4-10	65	27-32-35	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	5	6	48
	7-50	1-4-10	67	27-30-35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	50-62	1-4-10	69	25-28-35	1.30-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.3-0.5	.49	.49			
	62-80	1-3-10	70	25-28-35	1.30-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
300:														
Bremer, terrace	0-8	1-8-14	61	27-32-36	1.30-1.35	1.00-10.00	0.21-0.23	0.0-2.9	5.0-7.0	.37	.37	5	6	48
	8-19	1-8-14	61	27-32-36	1.30-1.35	1.00-10.00	0.21-0.23	0.0-2.9	5.0-7.0	.37	.37			
	19-42	1-8-14	53	35-40-45	1.30-1.45	0.10-1.00	0.18-0.20	6.0-8.9	1.0-2.0	.37	.37			
	42-50	1-8-14	58	30-35-40	1.30-1.40	0.10-1.00	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	50-60	10-15-40	52	25-34-40	1.40-1.50	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.37	.37			
337D2:														
Dickman, loamy substratum, moderately eroded	0-6	40-53-65	34	10-14-18	1.50-1.60	10.00-100.00	0.16-0.18	0.0-2.9	1.0-2.0	.32	.32	5	3	86
	6-19	60-70-80	16	10-14-18	1.50-1.60	10.00-100.00	0.15-0.17	0.0-2.9	0.0-1.0	.24	.24			
	19-46	80-88-95	6	4-7-10	1.55-1.65	10.00-100.00	0.09-0.11	0.0-2.9	0.0-0.5	.24	.24			
	46-56	60-70-80	16	10-14-18	1.55-1.65	10.00-100.00	0.14-0.16	0.0-2.9	0.0-0.5	.24	.24			
	56-69	80-90-95	3	4-7-10	1.60-1.70	100-705	0.05-0.07	0.0-2.9	0.0-0.5	.20	.20			
	69-80	1-3-5	71	25-26-35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
Sharpsburg, moderately eroded	0-8	1-3-5	64	27-34-34	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.7-3.7	.37	.37	5	6	48
	8-21	1-3-5	59	36-38-42	1.30-1.50	0.10-1.00	0.18-0.20	6.0-8.9	0.5-1.5	.37	.37			
	21-40	1-3-5	63	28-34-38	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.3-1.0	.43	.43			
	40-48	1-3-5	66	28-32-38	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.3-0.5	.43	.43			
	48-80	1-3-5	68	25-29-35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
370:														
Sharpsburg-----------	0-8	1- 3- 5	66	27-32- 34	1.25-1.35	1.00-10.00	0.21-0.23	3.0-5.9	3.0-4.0	.37	.37	5	6	48
	8-17	1- 2- 5	67	30-32- 34	1.25-1.35	1.00-10.00	0.21-0.23	3.0-5.9	2.0-3.5	.37	.37			
	17-31	1- 2- 5	59	36-40- 42	1.30-1.40	0.10-1.00	0.18-0.20	6.0-8.9	0.5-1.0	.37	.37			
	31-38	1- 2- 5	64	25-35- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.2-0.5	.43	.43			
	38-46	1- 2- 5	67	25-32- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.2-0.5	.49	.49			
	46-60	1- 2- 5	69	25-29- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.49	.49			
370B:														
Sharpsburg-----------	0-8	1- 3- 5	66	27-32- 34	1.25-1.35	1.00-10.00	0.21-0.23	3.0-5.9	3.0-4.0	.37	.37	5	6	48
	8-17	1- 2- 5	67	30-32- 34	1.25-1.35	1.00-10.00	0.21-0.23	3.0-5.9	2.0-3.5	.37	.37			
	17-31	1- 2- 5	59	36-40- 42	1.30-1.40	0.10-1.00	0.18-0.20	6.0-8.9	0.5-1.0	.37	.37			
	31-38	1- 2- 5	64	25-35- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.2-0.5	.43	.43			
	38-46	1- 2- 5	67	25-32- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.2-0.5	.49	.49			
	46-60	1- 2- 5	69	25-29- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.49	.49			
371C2:														
Sharpsburg, moderately eroded---	0-8	1- 3- 5	64	27-34- 34	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.7-3.7	.37	.37	5	6	48
	8-21	1- 3- 5	59	36-38- 42	1.30-1.50	0.10-1.00	0.18-0.20	6.0-8.9	0.5-1.5	.37	.37			
	21-40	1- 3- 5	63	28-34- 38	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.3-1.0	.43	.43			
	40-48	1- 3- 5	66	28-32- 38	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.3-0.5	.43	.43			
	48-80	1- 3- 5	68	25-29- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
Nira, moderately eroded--------------	0-7	1- 3- 5	65	30-32- 34	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	5	6	48
	7-12	1- 3- 5	63	33-34- 38	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
	12-44	1- 3- 5	65	30-32- 34	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
	44-60	1- 3- 5	69	25-28- 30	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
	60-80	1- 3- 5	69	25-28- 30	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
371D2:														
Sharpsburg-----------	0-8	1- 3- 5	66	27-32- 34	1.25-1.35	1.00-10.00	0.21-0.23	3.0-5.9	3.0-4.0	.37	.37	5	6	48
	8-17	1- 2- 5	67	30-32- 34	1.25-1.35	1.00-10.00	0.21-0.23	3.0-5.9	2.0-3.5	.37	.37			
	17-31	1- 2- 5	59	36-40- 42	1.30-1.40	0.10-1.00	0.18-0.20	6.0-8.9	0.5-1.0	.37	.37			
	31-38	1- 2- 5	64	25-35- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.2-0.5	.43	.43			
	38-46	1- 2- 5	67	25-32- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.2-0.5	.49	.49			
	46-60	1- 2- 5	69	25-29- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.49	.49			
Sharpsburg, moderately eroded---	0-8	1- 3- 5	64	27-34- 34	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.7-3.7	.37	.37	5	6	48
	8-21	1- 3- 5	59	36-38- 42	1.30-1.50	0.10-1.00	0.18-0.20	6.0-8.9	0.5-1.5	.37	.37			
	21-40	1- 3- 5	63	28-34- 38	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.3-1.0	.43	.43			
	40-48	1- 3- 5	66	28-32- 38	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.3-0.5	.43	.43			
	48-80	1- 3- 5	68	25-29- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
371D2:														
Nira, moderately eroded	0-7	1- 3- 5	65	30-32- 34	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	5	6	48
	7-12	1- 3- 5	63	33-34- 38	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
	12-44	1- 3- 5	65	30-32- 34	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
	44-60	1- 3- 5	69	25-28- 30	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
	60-80	1- 3- 5	69	25-28- 30	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
371E2:														
Sharpsburg, moderately eroded	0-8	1- 3- 5	64	27-34- 34	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.7-3.7	.37	.37	5	6	48
	8-21	1- 3- 5	59	36-38- 42	1.30-1.50	0.10-1.00	0.18-0.20	6.0-8.9	0.5-1.5	.37	.37			
	21-40	1- 3- 5	63	28-34- 38	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.3-1.0	.43	.43			
	40-48	1- 3- 5	66	28-32- 38	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.3-0.5	.43	.43			
	48-80	1- 3- 5	68	25-29- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
Nira, moderately eroded	0-7	1- 3- 5	65	30-32- 34	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	5	6	48
	7-12	1- 3- 5	63	33-34- 38	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
	12-44	1- 3- 5	65	30-32- 34	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
	44-60	1- 3- 5	69	25-28- 30	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
	60-80	1- 3- 5	69	25-28- 30	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
430:														
Ackmore, occasionally flooded	0-6	1-10- 15	68	18-23- 30	1.25-1.30	1.00-10.00	0.21-0.23	3.0-5.9	1.0-3.0	.43	.43	5	6	48
	6-25	1- 9- 15	67	18-24- 30	1.25-1.30	1.00-10.00	0.21-0.23	3.0-5.9	1.0-3.0	.43	.43			
	25-60	1- 7- 15	61	20-32- 38	1.30-1.40	1.00-10.00	0.18-0.20	6.0-8.9	3.0-5.0	.32	.32			
431B:														
Judson	0-9	1- 6- 10	65	24-29- 32	1.35-1.40	1.00-10.00	0.21-0.24	3.0-5.9	2.5-3.5	.37	.37	5	6	48
	9-22	1- 4- 10	67	24-29- 32	1.30-1.35	1.00-10.00	0.21-0.24	3.0-5.9	2.0-3.0	.43	.43			
	22-28	1- 4- 10	65	27-31- 32	1.25-1.30	1.00-10.00	0.18-0.22	3.0-5.9	2.0-3.0	.43	.43			
	28-35	1- 4- 10	63	30-33- 35	1.30-1.35	1.00-10.00	0.18-0.22	3.0-5.9	0.5-1.0	.43	.43			
	35-52	1- 6- 10	63	25-31- 32	1.35-1.40	1.00-10.00	0.18-0.22	3.0-5.9	0.5-1.0	.43	.43			
	52-60	1- 3- 10	68	25-29- 32	1.40-1.45	1.00-10.00	0.21-0.23	3.0-5.9	0.0-1.0	.49	.49			
Ackmore, rarely flooded	0-6	1-10- 15	68	18-23- 30	1.25-1.30	1.00-10.00	0.21-0.23	3.0-5.9	1.0-3.0	.43	.43	5	6	48
	6-25	1- 9- 15	67	18-24- 30	1.25-1.30	1.00-10.00	0.21-0.23	3.0-5.9	1.0-3.0	.43	.43			
	25-60	1- 7- 15	61	20-32- 38	1.30-1.40	1.00-10.00	0.18-0.20	6.0-8.9	3.0-5.0	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
431B:														
Colo, frequently flooded, overwash---	0-7	2-10- 25	67	20-24- 30	1.25-1.30	1.00-10.00	0.22-0.24	3.0-5.9	3.0-5.0	.32	.32	5	6	48
	7-15	2-10- 25	67	20-24- 30	1.25-1.30	1.00-10.00	0.22-0.24	3.0-5.9	3.0-5.0	.32	.32			
	15-50	1- 7- 15	61	30-33- 35	1.25-1.35	1.00-10.00	0.18-0.20	3.0-5.9	3.0-4.0	.28	.28			
	50-70	1- 7- 15	61	30-33- 35	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	1.0-2.0	.43	.43			
	70-80	5- 7- 30	61	30-33- 35	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
435:														
Zook, occasionally flooded-------------	0-7	1- 8- 14	59	32-34- 45	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	5.0-7.0	.32	.32	5	6	48
	7-20	1- 8- 14	57	32-36- 45	1.30-1.35	0.10-1.00	0.21-0.23	3.0-5.9	5.0-7.0	.32	.32			
	20-38	1- 8- 14	52	32-41- 45	1.30-1.45	0.01-0.10	0.11-0.13	6.0-8.9	3.0-5.0	.32	.32			
	38-61	1- 8- 14	55	36-38- 45	1.30-1.45	0.10-1.00	0.18-0.20	6.0-8.9	2.0-4.0	.32	.32			
	61-80	1- 8- 14	60	20-33- 45	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
Mt. Sterling, occasionally flooded	0-7	5-10- 15	68	18-23- 27	1.45-1.55	1.00-10.00	0.22-0.24	3.0-5.9	1.0-3.0	.43	.43	5	6	48
	7-26	5-10- 15	66	18-24- 30	1.45-1.55	1.00-10.00	0.20-0.22	3.0-5.9	0.5-1.0	.55	.55			
	26-54	3- 7- 10	54	35-40- 45	1.30-1.45	0.10-1.00	0.18-0.20	6.0-8.9	0.0-1.0	.37	.37			
	54-80	3- 7- 10	52	35-42- 48	1.30-1.35	0.01-0.10	0.10-0.12	6.0-8.9	0.0-1.0	.37	.37			
469C2:														
Lamoni, moderately eroded--------------	0-6	10-17- 30	50	27-34- 40	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	3	6	48
	6-23	10-15- 30	38	30-48- 55	1.25-1.40	0.01-0.10	0.09-0.11	6.0-8.9	0.5-2.0	.28	.28			
	23-55	20-30- 40	36	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	55-80	20-30- 40	36	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
Clarinda, moderately eroded--------------	0-6	1- 5- 14	63	25-33- 40	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	3	6	48
	6-80	1- 8- 14	42	40-50- 60	1.30-1.40	0.01-0.10	0.08-0.12	9.0-11.9	0.0-0.5	.32	.32			
Shelby, moderately eroded--------------	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
469C3:														
Lamoni, severely eroded--------------	0-7	10-33- 35	34	27-34- 40	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	1.7-2.7	.32	.32	2	6	48
	7-14	10-20- 30	33	30-48- 55	1.25-1.40	0.01-0.10	0.09-0.11	6.0-8.9	0.3-1.0	.28	.28			
	14-48	20-30- 40	36	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	48-60	20-30- 40	36	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
469C3:														
Clarinda, severely eroded---------------	0-4	1- 8- 14	45	40-48- 55	1.30-1.40	0.01-0.10	0.12-0.14	6.0-8.9	1.7-2.7	.28	.28	2	4	86
	4-80	1- 8- 14	43	40-50- 60	1.30-1.40	0.01-0.10	0.08-0.12	9.0-11.9	0.0-0.5	.32	.32			
Shelby, severely eroded---------------	0-2	20-33- 45	37	24-31- 35	1.50-1.60	1.00-10.00	0.17-0.19	3.0-5.9	1.2-2.2	.32	.32	4	6	48
	2-48	20-33- 45	34	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	48-62	30-33- 60	37	25-31- 36	1.55-1.65	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
	62-80	30-33- 60	37	25-31- 36	1.60-1.70	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
470D2:														
Lamoni, moderately eroded---------------	0-6	10-15- 30	52	27-34- 40	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	3	6	48
	6-23	10-15- 30	38	30-48- 55	1.25-1.40	0.01-0.10	0.09-0.11	6.0-8.9	0.5-2.0	.28	.28			
	23-55	20-30- 40	36	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	55-80	20-30- 40	36	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
Shelby, moderately eroded---------------	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
509B:														
Marshall, terrace----	0-7	1- 3- 10	66	25-31- 35	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	3.0-4.0	.28	.28	5	6	48
	7-22	1- 3- 10	64	27-33- 35	1.20-1.30	1.00-10.00	0.20-0.23	3.0-5.9	2.5-3.5	.28	.28			
	22-65	1- 3- 10	67	27-30- 35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.5	.43	.43			
	65-71	1- 3- 10	70	25-27- 30	1.25-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.3-1.0	.49	.49			
	71-80	1- 3- 10	70	25-27- 30	1.25-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
509C:														
Marshall, terrace----	0-7	1- 3- 10	66	25-31- 35	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	3.0-4.0	.28	.28	5	6	48
	7-22	1- 3- 10	64	27-33- 35	1.20-1.30	1.00-10.00	0.20-0.23	3.0-5.9	2.5-3.5	.28	.28			
	22-65	1- 3- 10	67	27-30- 35	1.25-1.30	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.5	.43	.43			
	65-71	1- 3- 10	70	25-27- 30	1.25-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.3-1.0	.49	.49			
	71-80	1- 3- 10	70	25-27- 30	1.25-1.35	1.00-10.00	0.18-0.20	3.0-5.9	0.0-0.5	.49	.49			
509C2:														
Marshall, terrace, moderately eroded---	0-6	1- 3- 10	67	25-30- 35	1.25-1.30	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	5	6	48
	6-60	1- 3- 10	66	27-31- 35	1.30-1.35	1.00-10.00	0.18-0.20	3.0-5.9	1.0-2.0	.37	.37			
	60-80	1- 3- 10	67	25-30- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
545B:														
Zook-----------------	0-7	1- 8- 14	59	32-34- 45	1.30-1.35	1.00-10.00	0.21-0.23	3.0-5.9	5.0-7.0	.32	.32	5	6	48
	7-20	1- 8- 14	57	32-36- 45	1.30-1.35	0.10-1.00	0.21-0.23	3.0-5.9	5.0-7.0	.32	.32			
	20-38	1- 8- 14	52	32-41- 45	1.30-1.45	0.01-0.10	0.11-0.13	6.0-8.9	3.0-5.0	.32	.32			
	38-61	1- 8- 14	55	36-38- 45	1.30-1.45	0.10-1.00	0.18-0.20	6.0-8.9	2.0-4.0	.32	.32			
	61-80	1- 8- 14	60	20-33- 45	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
Ely------------------	0-8	5-10- 20	62	20-28- 35	1.30-1.60	1.00-10.00	0.21-0.23	0.0-2.9	5.0-6.0	.32	.32	5	6	48
	8-32	5-10- 20	59	27-31- 35	1.30-1.55	1.00-10.00	0.21-0.23	3.0-5.9	4.0-5.0	.24	.24			
	32-58	5-10- 20	59	27-31- 35	1.30-1.55	1.00-10.00	0.18-0.20	3.0-5.9	1.0-3.0	.37	.37			
	58-80	5-10- 20	63	18-27- 35	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.49	.49			
Gullied land.														
733:														
Calco, occasionally flooded-------------	0-8	1- 7- 15	63	24-31- 35	1.25-1.30	1.00-10.00	0.21-0.23	3.0-5.9	5.0-7.0	.32	.32	5	4L	86
	8-50	1- 7- 15	63	24-31- 35	1.25-1.30	1.00-10.00	0.21-0.23	3.0-5.9	4.0-5.0	.32	.32			
	50-65	1- 6- 15	61	24-33- 35	1.25-1.30	1.00-10.00	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37			
	65-79	1- 7- 35	66	24-27- 35	1.30-1.45	1.00-10.00	0.18-0.20	3.0-5.9	1.0-2.0	.43	.43			
803:														
Melia, terrace-------	0-7	1- 3- 10	68	20-29- 35	1.25-1.30	1.00-10.00	0.21-0.23	3.0-5.9	3.5-4.5	.28	.28	5	6	48
	7-39	1- 3- 10	68	20-29- 35	1.25-1.30	1.00-10.00	0.20-0.23	1.0-5.9	2.5-3.5	.32	.32			
	39-76	1- 3- 10	68	20-29- 35	1.30-1.35	1.00-10.00	0.18-0.20	1.0-5.9	0.5-1.5	.49	.49			
	76-80	1- 3- 10	73	18-24- 30	1.35-1.40	1.00-10.00	0.18-0.20	1.0-4.5	0.3-1.0	.49	.49			
824E3:														
Shelby, severely eroded--------------	0-2	20-33- 45	37	24-31- 35	1.50-1.60	1.00-10.00	0.17-0.19	3.0-5.9	1.2-2.2	.32	.32	4	6	48
	2-48	20-33- 45	34	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	48-62	30-33- 60	37	25-31- 36	1.55-1.65	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
	62-80	30-33- 60	37	25-31- 36	1.60-1.70	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
Lamoni, severely eroded--------------	0-7	10-33- 35	34	27-34- 40	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	1.7-2.7	.32	.32	2	6	48
	7-14	10-20- 30	33	30-48- 55	1.25-1.40	0.01-0.10	0.09-0.11	6.0-8.9	0.3-1.0	.28	.28			
	14-48	20-30- 40	36	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	48-60	20-30- 40	36	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
870B:														
Sharpsburg, terrace--	0-8	1- 3- 5	66	27-32- 34	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	3.0-4.0	.37	.37	5	6	48
	8-17	1- 3- 5	64	30-33- 34	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.0-3.0	.37	.37			
	17-38	1- 3- 5	58	36-39- 42	1.35-1.40	0.10-1.00	0.18-0.20	6.0-8.9	1.0-2.0	.37	.37			
	38-60	1- 3- 5	67	25-30- 35	1.40-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.49	.49			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
1239:														
Corley, terrace------	0-10	1- 3- 5	74	20-24- 27	1.20-1.30	1.00-10.00	0.22-0.24	3.0-5.9	3.5-4.5	.32	.32	5	8	0
	10-18	1- 3- 5	74	20-24- 27	1.25-1.35	1.00-10.00	0.22-0.24	3.0-5.9	3.0-4.0	.32	.32			
	18-29	1- 3- 5	75	20-22- 24	1.40-1.50	1.00-10.00	0.20-0.22	3.0-5.9	1.0-1.5	.49	.49			
	29-60	1- 3- 5	68	26-29- 32	1.30-1.55	1.00-10.00	0.18-0.20	6.0-8.9	0.0-1.0	.49	.49			
	60-68	1- 3- 5	71	24-26- 28	1.40-1.50	1.00-10.00	0.20-0.22	3.0-5.9	0.0-0.5	.49	.49			
Minden, terrace------	0-7	1- 4- 10	67	27-30- 32	1.25-1.30	1.00-10.00	0.21-0.23	3.0-5.9	5.0-6.0	.37	.37	5	6	48
	7-22	1- 4- 10	64	27-32- 35	1.30-1.40	1.00-10.00	0.18-0.20	3.0-5.9	3.0-5.0	.32	.32			
	22-66	1- 4- 10	64	29-32- 35	1.40-1.45	1.00-10.00	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
	66-80	1- 4- 10	72	22-25- 27	1.40-1.45	1.00-10.00	0.20-0.22	3.0-5.9	0.5-1.0	.49	.49			
2428:														
Ely------------------	0-8	5-10- 20	62	20-28- 35	1.30-1.60	1.00-10.00	0.21-0.23	0.0-2.9	5.0-6.0	.32	.32	5	6	48
	8-32	5-10- 20	59	27-31- 35	1.30-1.55	1.00-10.00	0.21-0.23	3.0-5.9	4.0-5.0	.24	.24			
	32-58	5-10- 20	59	27-31- 35	1.30-1.55	1.00-10.00	0.18-0.20	3.0-5.9	1.0-3.0	.37	.37			
	58-80	5-10- 20	63	18-27- 35	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.5-1.0	.49	.49			
Colo, overwash-------	0-7	2-10- 25	67	20-24- 30	1.25-1.30	1.00-10.00	0.22-0.24	3.0-5.9	3.0-5.0	.32	.32	5	6	48
	7-15	2-10- 25	67	20-24- 30	1.25-1.30	1.00-10.00	0.22-0.24	3.0-5.9	3.0-5.0	.32	.32			
	15-50	1- 7- 15	61	30-33- 35	1.25-1.35	1.00-10.00	0.18-0.20	3.0-5.9	3.0-4.0	.28	.28			
	50-70	1- 7- 15	61	30-33- 35	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	1.0-2.0	.43	.43			
	70-80	5- 7- 30	61	30-33- 35	1.35-1.45	1.00-10.00	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
Mt. Sterling---------	0-7	5-10- 15	68	18-23- 27	1.45-1.55	1.00-10.00	0.22-0.24	3.0-5.9	1.0-3.0	.43	.43	5	6	48
	7-26	5-10- 15	66	18-24- 30	1.45-1.55	1.00-10.00	0.20-0.22	3.0-5.9	0.5-1.0	.55	.55			
	26-54	3- 7- 10	54	35-40- 45	1.30-1.45	0.10-1.00	0.18-0.20	6.0-8.9	0.0-1.0	.37	.37			
	54-80	3- 7- 10	52	35-42- 48	1.30-1.35	0.01-0.10	0.10-0.12	6.0-8.9	0.0-1.0	.37	.37			
4946C. Udorthents- Interstate highway														
5030. Pits, limestone quarry														
5040. Udorthents, loamy														
5080. Udorthents, sanitary landfill														
AW. Animal waste lagoon														

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
SL. Sewage lagoon														
W. Water														
Y8B: Judson	0-9	1- 6- 10	65	24-29- 32	1.35-1.40	1.00-10.00	0.21-0.24	3.0-5.9	2.5-3.5	.37	.37	5	6	48
	9-22	1- 4- 10	67	24-29- 32	1.30-1.35	1.00-10.00	0.21-0.24	3.0-5.9	2.0-3.0	.43	.43			
	22-28	1- 4- 10	65	27-31- 32	1.25-1.30	1.00-10.00	0.18-0.22	3.0-5.9	2.0-3.0	.43	.43			
	28-35	1- 4- 10	63	30-33- 35	1.30-1.35	1.00-10.00	0.18-0.22	3.0-5.9	0.5-1.0	.43	.43			
	35-52	1- 6- 10	63	25-31- 32	1.35-1.40	1.00-10.00	0.18-0.22	3.0-5.9	0.5-1.0	.43	.43			
	52-60	1- 3- 10	68	25-29- 32	1.40-1.45	1.00-10.00	0.21-0.23	3.0-5.9	0.0-1.0	.49	.49			
Y8C: Judson	0-9	1- 6- 10	65	24-29- 32	1.35-1.40	1.00-10.00	0.21-0.24	3.0-5.9	2.5-3.5	.37	.37	5	6	48
	9-22	1- 4- 10	67	24-29- 32	1.30-1.35	1.00-10.00	0.21-0.24	3.0-5.9	2.0-3.0	.43	.43			
	22-28	1- 4- 10	65	27-31- 32	1.25-1.30	1.00-10.00	0.18-0.22	3.0-5.9	2.0-3.0	.43	.43			
	28-35	1- 4- 10	63	30-33- 35	1.30-1.35	1.00-10.00	0.18-0.22	3.0-5.9	0.5-1.0	.43	.43			
	35-52	1- 6- 10	63	25-31- 32	1.35-1.40	1.00-10.00	0.18-0.22	3.0-5.9	0.5-1.0	.43	.43			
	52-60	1- 3- 10	68	25-29- 32	1.40-1.45	1.00-10.00	0.21-0.23	3.0-5.9	0.0-1.0	.49	.49			
Y24C2: Shelby, moderately eroded	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Y24D2: Shelby, moderately eroded	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Y24D3: Shelby, severely eroded	0-2	20-33- 45	37	24-31- 35	1.50-1.60	1.00-10.00	0.17-0.19	3.0-5.9	1.2-2.2	.32	.32	4	6	48
	2-48	20-33- 45	34	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	48-62	30-33- 60	37	25-31- 36	1.55-1.65	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
	62-80	30-33- 60	37	25-31- 36	1.60-1.70	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
Y24E:														
Shelby	0-7	20-35- 45	37	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	3.0-4.0	.24	.24	5	6	48
	7-11	20-34- 45	37	24-30- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.0-3.0	.28	.28			
	11-46	20-34- 45	33	30-34- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	46-60	20-34- 45	37	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	60-80	30-34- 50	37	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Y24E2:														
Shelby, moderately eroded	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Y24E3:														
Shelby, severely eroded	0-2	20-33- 45	37	24-31- 35	1.50-1.60	1.00-10.00	0.17-0.19	3.0-5.9	1.2-2.2	.32	.32	4	6	48
	2-48	20-33- 45	34	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	48-62	30-33- 60	37	25-31- 36	1.55-1.65	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
	62-80	30-33- 60	37	25-31- 36	1.60-1.70	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
Y24F2:														
Shelby, moderately eroded	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Y24F3:														
Shelby, severely eroded	0-2	20-33- 45	37	24-31- 35	1.50-1.60	1.00-10.00	0.17-0.19	3.0-5.9	1.2-2.2	.32	.32	4	6	48
	2-48	20-33- 45	34	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	48-62	30-33- 60	37	25-31- 36	1.55-1.65	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
	62-80	30-33- 60	37	25-31- 36	1.60-1.70	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
Y82C3:														
Adair, severely eroded	0-3	15-23- 30	46	24-32- 40	1.45-1.55	1.00-10.00	0.17-0.19	3.0-5.9	1.7-2.7	.37	.37	2	6	48
	3-26	15-25- 35	26	38-49- 60	1.25-1.40	0.01-0.10	0.09-0.11	6.0-8.9	0.5-1.0	.24	.24			
	26-59	15-25- 35	41	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	59-70	20-33- 45	34	30-34- 38	1.55-1.65	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	70-80	20-33- 45	34	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.7	0.0-0.5	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
Y82C3:														
Shelby, severely eroded	0-2	20-33- 45	37	24-31- 35	1.50-1.60	1.00-10.00	0.17-0.19	3.0-5.9	1.2-2.2	.32	.32	4	6	48
	2-48	20-33- 45	34	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	48-62	30-33- 60	37	25-31- 36	1.55-1.65	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
	62-80	30-33- 60	37	25-31- 36	1.60-1.70	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
Y93D2:														
Shelby, moderately eroded	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Adair, moderately eroded	0-7	15-23- 30	46	24-32- 40	1.45-1.55	1.00-10.00	0.17-0.19	3.0-5.0	2.2-3.2	.37	.37	3	6	48
	7-17	15-25- 35	26	38-49- 60	1.25-1.40	0.01-0.10	0.09-0.11	6.0-11.2	0.5-1.0	.24	.24			
	17-60	15-25- 35	41	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	60-76	20-33- 45	34	30-34- 38	1.55-1.65	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	76-80	20-33- 45	34	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
Y93D3:														
Shelby, severely eroded	0-2	20-33- 45	37	24-31- 35	1.50-1.60	1.00-10.00	0.17-0.19	3.0-5.9	1.2-2.2	.32	.32	4	6	48
	2-48	20-33- 45	34	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	48-62	30-33- 60	37	25-31- 36	1.55-1.65	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
	62-80	30-33- 60	37	25-31- 36	1.60-1.70	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
Adair, severely eroded	0-3	15-23- 30	46	24-32- 40	1.45-1.55	1.00-10.00	0.17-0.19	3.0-5.9	1.7-2.7	.37	.37	2	6	48
	3-26	15-25- 35	26	38-49- 60	1.25-1.40	0.01-0.10	0.09-0.11	6.0-8.9	0.5-1.0	.24	.24			
	26-59	15-25- 35	41	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	59-70	20-33- 45	34	30-34- 38	1.55-1.65	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	70-80	20-33- 45	34	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.7	0.0-0.5	.32	.32			
Y93E2:														
Shelby, moderately eroded	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
Y93E2:														
Adair, moderately eroded	0-7	15-23- 30	46	24-32- 40	1.45-1.55	1.00-10.00	0.17-0.19	3.0-5.0	2.2-3.2	.37	.37	3	6	48
	7-17	15-25- 35	26	38-49- 60	1.25-1.40	0.01-0.10	0.09-0.11	6.0-11.2	0.5-1.0	.24	.24			
	17-60	15-25- 35	41	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	60-76	20-33- 45	34	30-34- 38	1.55-1.65	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	76-80	20-33- 45	34	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
Y192C2:														
Adair, moderately eroded	0-7	15-23- 30	46	24-32- 40	1.45-1.55	0.10-1.00	0.17-0.19	3.2-5.8	2.2-3.2	.37	.37	3	6	48
	7-17	15-25- 35	26	38-49- 60	1.25-1.40	0.10-0.40	0.09-0.11	6.7-13.7	0.5-1.0	.24	.24			
	17-60	15-25- 35	41	30-34- 38	1.50-1.60	0.10-1.00	0.15-0.17	4.2-6.7	0.0-0.5	.37	.37			
	60-76	20-33- 45	34	30-34- 38	1.55-1.65	0.10-1.00	0.14-0.16	4.2-6.7	0.0-0.5	.32	.32			
	76-80	20-33- 45	34	30-34- 38	1.60-1.70	0.10-1.00	0.14-0.16	4.2-6.7	0.0-0.5	.32	.32			
Y192D2:														
Adair, moderately eroded	0-7	15-23- 30	46	24-32- 40	1.45-1.55	1.00-10.00	0.17-0.19	3.0-5.0	2.2-3.2	.37	.37	3	6	48
	7-17	15-25- 35	26	38-49- 60	1.25-1.40	0.01-0.10	0.09-0.11	6.0-11.2	0.5-1.0	.24	.24			
	17-60	15-25- 35	41	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	60-76	20-33- 45	34	30-34- 38	1.55-1.65	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	76-80	20-33- 45	34	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
Y222C2:														
Clarinda, moderately eroded	0-6	1- 5- 14	63	25-33- 40	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	3	6	48
	6-80	1- 8- 14	42	40-50- 60	1.30-1.40	0.01-0.10	0.08-0.12	9.0-11.9	0.0-0.5	.32	.32			
Y222D2:														
Clarinda, moderately eroded	0-6	1- 5- 14	63	25-33- 40	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	3	6	48
	6-80	1- 8- 14	42	40-50- 60	1.30-1.40	0.01-0.10	0.08-0.12	9.0-11.9	0.0-0.5	.32	.32			
Y222D3:														
Clarinda, severely eroded	0-4	1- 8- 14	45	40-48- 55	1.30-1.40	0.01-0.10	0.12-0.14	6.0-8.9	1.7-2.7	.28	.28	2	4	86
	4-80	1- 8- 14	43	40-50- 60	1.30-1.40	0.01-0.10	0.08-0.12	9.0-11.9	0.0-0.5	.32	.32			
Z8B:														
Judson	0-9	1- 6- 10	65	24-29- 32	1.35-1.40	1.00-10.00	0.21-0.24	3.0-5.9	2.5-3.5	.37	.37	5	6	48
	9-22	1- 4- 10	67	24-29- 32	1.30-1.35	1.00-10.00	0.21-0.24	3.0-5.9	2.0-3.0	.43	.43			
	22-28	1- 4- 10	65	27-31- 32	1.25-1.30	1.00-10.00	0.18-0.22	3.0-5.9	2.0-3.0	.43	.43			
	28-35	1- 4- 10	63	30-33- 35	1.30-1.35	1.00-10.00	0.18-0.22	3.0-5.9	0.5-1.0	.43	.43			
	35-52	1- 6- 10	63	25-31- 32	1.35-1.40	1.00-10.00	0.18-0.22	3.0-5.9	0.5-1.0	.43	.43			
	52-60	1- 3- 10	68	25-29- 32	1.40-1.45	1.00-10.00	0.21-0.23	3.0-5.9	0.0-1.0	.49	.49			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
Z8C:														
Judson	0-9	1- 6- 10	65	24-29- 32	1.35-1.40	1.00-10.00	0.21-0.24	3.0-5.9	2.5-3.5	.37	.37	5	6	48
	9-22	1- 4- 10	67	24-29- 32	1.30-1.35	1.00-10.00	0.21-0.24	3.0-5.9	2.0-3.0	.43	.43			
	22-28	1- 4- 10	65	27-31- 32	1.25-1.30	1.00-10.00	0.18-0.22	3.0-5.9	2.0-3.0	.43	.43			
	28-35	1- 4- 10	63	30-33- 35	1.30-1.35	1.00-10.00	0.18-0.22	3.0-5.9	0.5-1.0	.43	.43			
	35-52	1- 6- 10	63	25-31- 32	1.35-1.40	1.00-10.00	0.18-0.22	3.0-5.9	0.5-1.0	.43	.43			
	52-60	1- 3- 10	68	25-29- 32	1.40-1.45	1.00-10.00	0.21-0.23	3.0-5.9	0.0-1.0	.49	.49			
Z24D2:														
Shelby, moderately eroded	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Z24D3:														
Shelby, severely eroded	0-2	20-33- 45	37	24-31- 35	1.50-1.60	1.00-10.00	0.17-0.19	3.0-5.9	1.2-2.2	.32	.32	4	6	48
	2-48	20-33- 45	34	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	48-62	30-33- 60	37	25-31- 36	1.55-1.65	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
	62-80	30-33- 60	37	25-31- 36	1.60-1.70	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
Z24E2:														
Shelby, moderately eroded	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Z24E3:														
Shelby, severely eroded	0-2	20-33- 45	37	24-31- 35	1.50-1.60	1.00-10.00	0.17-0.19	3.0-5.9	1.2-2.2	.32	.32	4	6	48
	2-48	20-33- 45	34	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	48-62	30-33- 60	37	25-31- 36	1.55-1.65	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
	62-80	30-33- 60	37	25-31- 36	1.60-1.70	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
Z24F2:														
Shelby, moderately eroded	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
Z82D3:														
Adair, severely eroded--------------	0-3	15-23- 30	46	24-32- 40	1.45-1.55	1.00-10.00	0.17-0.19	3.0-5.9	1.7-2.7	.37	.37	2	6	48
	3-26	15-25- 35	26	38-49- 60	1.25-1.40	0.01-0.10	0.09-0.11	6.0-8.9	0.5-1.0	.24	.24			
	26-59	15-25- 35	41	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	59-70	20-33- 45	34	30-34- 38	1.55-1.65	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	70-80	20-33- 45	34	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.7	0.0-0.5	.32	.32			
Shelby, severely eroded--------------	0-2	20-33- 45	37	24-31- 35	1.50-1.60	1.00-10.00	0.17-0.19	3.0-5.9	1.2-2.2	.32	.32	4	6	48
	2-48	20-33- 45	34	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-1.0	.32	.32			
	48-62	30-33- 60	37	25-31- 36	1.55-1.65	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
	62-80	30-33- 60	37	25-31- 36	1.60-1.70	1.00-10.00	0.14-0.19	3.0-5.9	0.0-0.5	.32	.32			
Z93C2:														
Shelby, moderately eroded--------------	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Adair, moderately eroded--------------	0-7	15-23- 30	46	24-32- 40	1.45-1.55	1.00-10.00	0.17-0.19	3.0-5.0	2.2-3.2	.37	.37	3	6	48
	7-17	15-25- 35	26	38-49- 60	1.25-1.40	0.01-0.10	0.09-0.11	6.0-11.2	0.5-1.0	.24	.24			
	17-60	15-25- 35	41	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	60-76	20-33- 45	34	30-34- 38	1.55-1.65	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	76-80	20-33- 45	34	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
Z93D2:														
Shelby, moderately eroded--------------	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Adair, moderately eroded--------------	0-7	15-23- 30	46	24-32- 40	1.45-1.55	1.00-10.00	0.17-0.19	3.0-5.0	2.2-3.2	.37	.37	3	6	48
	7-17	15-25- 35	26	38-49- 60	1.25-1.40	0.01-0.10	0.09-0.11	6.0-11.2	0.5-1.0	.24	.24			
	17-60	15-25- 35	41	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	60-76	20-33- 45	34	30-34- 38	1.55-1.65	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	76-80	20-33- 45	34	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
Z93E2:														
Shelby, moderately eroded	0-7	20-35- 45	36	24-29- 35	1.40-1.50	1.00-10.00	0.17-0.19	3.0-5.9	2.2-3.2	.28	.28	5	6	48
	7-37	20-35- 45	33	30-32- 38	1.45-1.55	1.00-10.00	0.15-0.17	3.0-5.9	0.5-1.5	.28	.28			
	37-45	20-35- 45	35	25-30- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	45-80	30-35- 60	37	25-28- 36	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Adair, moderately eroded	0-7	15-23- 30	46	24-32- 40	1.45-1.55	1.00-10.00	0.17-0.19	3.0-5.0	2.2-3.2	.37	.37	3	6	48
	7-17	15-25- 35	26	38-49- 60	1.25-1.40	0.01-0.10	0.09-0.11	6.0-11.2	0.5-1.0	.24	.24			
	17-60	15-25- 35	41	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	60-76	20-33- 45	34	30-34- 38	1.55-1.65	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	76-80	20-33- 45	34	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
Z192C3:														
Adair, severely eroded	0-3	15-23- 30	46	24-32- 40	1.45-1.55	1.00-10.00	0.17-0.19	3.0-5.9	1.7-2.7	.37	.37	2	6	48
	3-26	15-25- 35	26	38-49- 60	1.25-1.40	0.01-0.10	0.09-0.11	6.0-8.9	0.5-1.0	.24	.24			
	26-59	15-25- 35	41	30-34- 38	1.50-1.60	1.00-10.00	0.15-0.17	3.0-5.9	0.0-0.5	.32	.32			
	59-70	20-33- 45	34	30-34- 38	1.55-1.65	1.00-10.00	0.14-0.16	3.0-5.9	0.0-0.5	.32	.32			
	70-80	20-33- 45	34	30-34- 38	1.60-1.70	1.00-10.00	0.14-0.16	3.0-5.7	0.0-0.5	.32	.32			
Z222D2:														
Clarinda, moderately eroded	0-6	1- 5- 14	63	25-33- 40	1.30-1.40	1.00-10.00	0.21-0.23	3.0-5.9	2.2-3.2	.37	.37	3	6	48
	6-80	1- 8- 14	42	40-50- 60	1.30-1.40	0.01-0.10	0.08-0.12	9.0-11.9	0.0-0.5	.32	.32			

Chemical Properties

The table described in this section shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	pH	Pct
7:				
Wiota, rarely flooded	0-8	17-27	5.1-7.3	0
	8-28	17-27	5.1-7.3	0
	28-59	24-28	5.1-6.5	0
	59-80	17-27	5.6-6.5	0
7B:				
Wiota, rarely flooded	0-8	17-27	5.1-7.3	0
	8-28	17-27	5.1-7.3	0
	28-59	24-28	5.1-6.5	0
	59-80	17-27	5.6-6.5	0
9:				
Marshall-------------	0-7	21-29	5.6-7.3	0
	7-22	23-29	5.6-7.3	0
	22-65	21-28	5.6-6.5	0
	65-71	19-24	5.6-7.3	0
	71-80	17-23	6.1-7.3	0
9B:				
Marshall-------------	0-7	21-29	5.6-7.3	0
	7-22	23-29	5.6-7.3	0
	22-65	21-28	5.6-6.5	0
	65-71	19-24	5.6-7.3	0
	71-80	17-23	6.1-7.3	0
9C2:				
Marshall, moderately eroded--------------	0-7	22-29	5.6-7.3	0
	7-50	21-28	5.6-6.5	0
	50-62	19-27	6.1-7.3	0
	62-80	17-27	6.1-7.3	0
9C3:				
Marshall, severely eroded--------------	0-5	22-28	5.6-7.3	0
	5-41	21-28	5.6-7.3	0
	41-50	17-27	5.6-7.3	0
	50-80	17-28	5.6-7.3	0
9D2:				
Marshall, moderately eroded--------------	0-7	22-29	5.6-7.3	0
	7-50	21-28	5.6-6.5	0
	50-62	19-27	6.1-7.3	0
	62-80	17-27	6.1-7.3	0
15B:				
Olmitz---------------	0-7	20-23	5.6-7.3	0
	7-30	19-28	5.1-7.3	0
	30-60	22-28	5.1-7.3	0
Ely------------------	0-8	18-30	5.6-7.3	0
	8-32	23-29	5.6-7.3	0
	32-58	22-29	5.6-7.3	0
	58-80	15-28	5.6-7.3	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	pH	Pct
15B:				
Zook	0-7	26-36	5.6-7.8	0-10
	7-20	26-36	5.6-7.8	0-10
	20-38	26-35	5.6-7.8	0-10
	38-61	28-35	6.1-7.3	0
	61-80	15-33	6.1-7.3	0
16:				
Nodaway, occasionally flooded	0-7	15-29	6.1-7.3	0
	7-80	13-27	6.1-7.3	0
Kennebec, occasionally flooded	0-8	16-23	5.6-7.3	0
	8-54	16-23	6.1-7.3	0
	54-80	20-22	6.1-7.3	0
43:				
Bremer, rarely flooded	0-8	23-29	5.6-7.3	0
	8-19	23-29	5.6-7.3	0
	19-42	27-34	5.6-7.3	0
	42-50	23-30	5.6-7.3	0
	50-60	20-30	5.6-7.8	0-10
54:				
Zook, occasionally flooded	0-7	26-36	5.6-7.8	0-10
	7-20	26-36	5.6-7.8	0-10
	20-38	26-35	5.6-7.8	0-10
	38-61	28-35	6.1-7.3	0
	61-80	15-33	6.1-7.3	0
54+:				
Zook, occasionally flooded, overwash	0-7	17-22	5.6-7.8	0-10
	7-13	17-22	5.6-7.8	0-10
	13-50	26-35	5.6-7.8	0-10
	50-58	28-35	6.1-7.3	0
	58-80	15-33	6.1-7.3	0
88:				
Nevin, rarely flooded	0-8	22-25	5.6-7.3	0
	8-24	22-25	5.6-7.3	0
	24-46	24-28	5.6-7.3	0
	46-62	17-27	6.1-7.3	0
99D2:				
Exira, moderately eroded	0-6	23-28	5.6-7.3	0
	6-33	20-28	5.6-7.3	0
	33-37	17-27	5.6-7.3	0
	37-80	14-23	6.1-7.3	0
99D3:				
Exira, severely eroded	0-5	23-28	5.6-7.3	0
	5-36	19-27	5.6-7.3	0
	36-44	17-27	5.6-7.3	0
	44-80	14-23	6.1-7.3	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	pH	Pct
99E2:				
Exira, moderately eroded	0-6	23-28	5.6-7.3	0
	6-33	20-28	5.6-7.3	0
	33-37	17-27	5.6-7.3	0
	37-80	14-23	6.1-7.3	0
99E3:				
Exira, severely eroded	0-5	23-28	5.6-7.3	0
	5-36	19-27	5.6-7.3	0
	36-44	17-27	5.6-7.3	0
	44-80	14-23	6.1-7.3	0
113B:				
Colo, frequently flooded, overwash	0-7	17-26	6.1-7.8	0-10
	7-15	17-26	6.1-7.3	0
	15-50	25-29	5.6-7.3	0
	50-70	24-28	5.6-7.3	0
	70-80	20-28	5.6-7.3	0
Ely	0-8	18-30	5.6-7.3	0
	8-32	23-29	5.6-7.3	0
	32-58	22-29	5.6-7.3	0
	58-80	15-28	5.6-7.3	0
136:				
Ankeny, occasionally flooded	0-7	9.2-16	6.1-7.3	0
	7-30	9.2-16	6.1-7.3	0
	30-44	8.6-14	6.1-7.3	0
	44-60	1.8-7.1	6.1-7.8	0-10
212:				
Kennebec, occasionally flooded	0-8	16-23	5.6-7.3	0
	8-54	16-23	6.1-7.3	0
	54-80	20-22	6.1-7.3	0
220:				
Nodaway, occasionally flooded	0-7	15-29	6.1-7.3	0
	7-80	13-27	6.1-7.3	0
229C2:				
Clarinda, moderately eroded	0-6	21-31	5.1-7.3	0
	6-80	26-42	5.1-7.3	0
Clarinda, severely eroded	0-4	31-41	5.1-7.3	0
	4-80	26-42	5.1-7.3	0
229D2:				
Clarinda, moderately eroded	0-6	21-31	5.1-7.3	0
	6-80	26-42	5.1-7.3	0
Clarinda, severely eroded	0-4	31-41	5.1-7.3	0
	4-80	26-42	5.1-7.3	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	pH	Pct
247D2:				
Shelby, sandy substratum, moderately eroded	0-5	17-22	5.1-7.3	0
	5-33	20-30	5.1-7.3	0
	33-51	14-21	5.6-7.3	0
	51-80	6.2-15	6.6-8.4	0-20
Hesch, deep, moderately eroded	0-7	11-14	5.1-7.3	0
	7-18	5.4-14	5.6-7.3	0
	18-39	5.1-9.6	5.1-6.5	0
	39-49	1.0-4.3	4.5-6.5	0
	49-80	---	---	---
Hesch, moderately eroded	0-9	5.5-15	5.1-6.5	0
	9-17	14-19	5.1-7.3	0
	17-28	0.5-2.7	4.5-7.3	0
	28-80	---	---	---
269:				
Humeston, occasionally flooded, occasionally ponded	0-11	20-25	5.6-7.3	0
	11-25	17-21	5.1-7.3	0
	25-31	23-27	5.6-7.3	0
	31-72	27-36	5.6-7.3	0
	72-80	23-29	5.6-7.3	0
273B:				
Olmitz	0-7	20-23	5.6-7.3	0
	7-30	19-28	5.1-7.3	0
	30-60	22-28	5.1-7.3	0
289D2:				
Dickman, loamy substratum, moderately eroded	0-6	7.3-13	5.6-7.3	0
	6-19	4.3-12	5.1-6.5	0
	19-46	2.1-6.7	5.1-6.5	0
	46-56	4.3-11	5.1-6.5	0
	56-69	2.1-6.7	5.6-7.3	0
	69-80	8.8-18	5.6-7.3	0
Marshall, moderately eroded	0-7	22-29	5.6-7.3	0
	7-50	21-28	5.6-6.5	0
	50-62	19-27	6.1-7.3	0
	62-80	17-27	6.1-7.3	0
300:				
Bremer, terrace	0-8	23-29	5.6-7.3	0
	8-19	23-29	5.6-7.3	0
	19-42	27-34	5.6-7.3	0
	42-50	23-30	5.6-7.3	0
	50-60	20-30	5.6-7.8	0-10

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	pH	Pct
337D2:				
Dickman, loamy substratum, moderately eroded---	0-6	7.3-13	5.6-7.3	0
	6-19	4.3-12	5.1-6.5	0
	19-46	2.1-6.7	5.1-6.5	0
	46-56	4.3-11	5.1-6.5	0
	56-69	2.1-6.7	5.6-7.3	0
	69-80	8.8-18	5.6-7.3	0
Sharpsburg, moderately eroded---	0-8	22-27	5.1-6.5	0
	8-21	27-32	5.1-6.5	0
	21-40	21-29	5.6-6.5	0
	40-48	21-28	5.6-6.5	0
	48-80	18-26	5.6-7.3	0
370:				
Sharpsburg-----------	0-8	22-27	5.1-6.5	0
	8-17	24-27	5.1-6.5	0
	17-31	27-31	5.1-6.5	0
	31-38	19-26	5.1-6.5	0
	38-46	19-26	5.6-7.3	0
	46-60	18-27	5.6-7.3	0
370B:				
Sharpsburg-----------	0-8	22-27	5.1-6.5	0
	8-17	24-27	5.1-6.5	0
	17-31	27-31	5.1-6.5	0
	31-38	19-26	5.1-6.5	0
	38-46	19-26	5.6-7.3	0
	46-60	18-27	5.6-7.3	0
371C2:				
Sharpsburg, moderately eroded---	0-8	22-27	5.1-6.5	0
	8-21	27-32	5.1-6.5	0
	21-40	21-29	5.6-6.5	0
	40-48	21-28	5.6-6.5	0
	48-80	18-26	5.6-7.3	0
Nira, moderately eroded--------------	0-7	25-28	5.6-7.3	0
	7-12	22-29	5.6-7.3	0
	12-44	20-26	5.6-7.3	0
	44-60	17-23	6.1-7.3	0
	60-80	17-23	5.6-7.3	0
371D2:				
Sharpsburg-----------	0-8	22-27	5.1-6.5	0
	8-17	24-27	5.1-6.5	0
	17-31	27-31	5.1-6.5	0
	31-38	19-26	5.1-6.5	0
	38-46	19-26	5.6-7.3	0
	46-60	18-27	5.6-7.3	0
Sharpsburg, moderately eroded---	0-8	22-27	5.1-6.5	0
	8-21	27-32	5.1-6.5	0
	21-40	21-29	5.6-6.5	0
	40-48	21-28	5.6-6.5	0
	48-80	18-26	5.6-7.3	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	pH	Pct
371D2:				
Nira, moderately eroded	0-7	25-28	5.6-7.3	0
	7-12	22-29	5.6-7.3	0
	12-44	20-26	5.6-7.3	0
	44-60	17-23	6.1-7.3	0
	60-80	17-23	5.6-7.3	0
371E2:				
Sharpsburg, moderately eroded	0-8	22-27	5.1-6.5	0
	8-21	27-32	5.1-6.5	0
	21-40	21-29	5.6-6.5	0
	40-48	21-28	5.6-6.5	0
	48-80	18-26	5.6-7.3	0
Nira, moderately eroded	0-7	25-28	5.6-7.3	0
	7-12	22-29	5.6-7.3	0
	12-44	20-26	5.6-7.3	0
	44-60	17-23	6.1-7.3	0
	60-80	17-23	5.6-7.3	0
430:				
Ackmore, occasionally flooded	0-6	15-25	5.6-7.3	0
	6-25	15-25	5.6-7.3	0
	25-60	17-32	5.6-7.8	0-10
431B:				
Judson	0-9	20-27	4.5-7.3	0
	9-22	20-27	4.5-7.3	0
	22-28	22-27	5.6-7.3	0
	28-35	23-28	5.6-7.3	0
	35-52	20-25	6.1-7.8	0-10
	52-60	17-25	6.1-7.8	0-10
Ackmore, rarely flooded	0-6	15-25	5.6-7.3	0
	6-25	15-25	5.6-7.3	0
	25-60	17-32	5.6-7.8	0-10
Colo, frequently flooded, overwash	0-7	17-26	6.1-7.8	0-10
	7-15	17-26	6.1-7.3	0
	15-50	25-29	5.6-7.3	0
	50-70	24-28	5.6-7.3	0
	70-80	20-28	5.6-7.3	0
435:				
Zook, occasionally flooded	0-7	26-36	5.6-7.8	0-10
	7-20	26-36	5.6-7.8	0-10
	20-38	26-35	5.6-7.8	0-10
	38-61	28-35	6.1-7.3	0
	61-80	15-33	6.1-7.3	0
Mt. Sterling, occasionally flooded	0-7	15-23	5.6-7.3	0
	7-26	15-24	5.6-7.3	0
	26-54	23-35	4.5-7.3	0
	54-80	23-37	4.5-7.8	0-10

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	pH	Pct
469C2:				
Lamoni, moderately eroded	0-6	22-31	5.1-7.3	0
	6-23	23-41	5.1-6.5	0
	23-55	21-28	5.1-7.3	0
	55-80	21-28	5.6-7.3	0
Clarinda, moderately eroded	0-6	21-31	5.1-7.3	0
	6-80	26-42	5.1-7.3	0
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
469C3:				
Lamoni, severely eroded	0-7	22-31	5.1-7.3	0
	7-14	22-40	5.1-6.5	0
	14-48	21-28	5.1-7.3	0
	48-60	21-28	5.6-7.3	0
Clarinda, severely eroded	0-4	31-41	5.1-7.3	0
	4-80	26-42	5.1-7.3	0
Shelby, severely eroded	0-2	20-28	5.1-7.3	0
	2-48	20-30	5.1-7.3	0
	48-62	17-27	6.6-8.4	0-20
	62-80	17-27	6.6-8.4	0-20
470D2:				
Lamoni, moderately eroded	0-6	22-31	5.1-7.3	0
	6-23	23-41	5.1-6.5	0
	23-55	21-28	5.1-7.3	0
	55-80	21-28	5.6-7.3	0
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
509B:				
Marshall, terrace	0-7	21-29	5.6-7.3	0
	7-22	23-29	5.6-7.3	0
	22-65	21-28	5.6-6.5	0
	65-71	19-24	5.6-7.3	0
	71-80	17-23	6.1-7.3	0
509C:				
Marshall, terrace	0-7	21-29	5.6-7.3	0
	7-22	23-29	5.6-7.3	0
	22-65	21-28	5.6-6.5	0
	65-71	19-24	5.6-7.3	0
	71-80	17-23	6.1-7.3	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	pH	Pct
509C2:				
Marshall, terrace, moderately eroded	0-6	21-29	5.6-7.3	0
	6-60	22-28	5.6-6.5	0
	60-80	17-28	6.1-7.3	0
545B:				
Zook	0-7	26-36	5.6-7.8	0-10
	7-20	26-36	5.6-7.8	0-10
	20-38	26-35	5.6-7.8	0-10
	38-61	28-35	6.1-7.3	0
	61-80	15-33	6.1-7.3	0
Ely	0-8	18-30	5.6-7.3	0
	8-32	23-29	5.6-7.3	0
	32-58	22-29	5.6-7.3	0
	58-80	15-28	5.6-7.3	0
Gullied land.				
733:				
Calco, occasionally flooded	0-8	21-30	7.4-8.4	5-20
	8-50	21-29	7.4-8.4	5-20
	50-65	20-29	7.4-8.4	5-20
	65-79	20-28	7.4-8.4	5-20
803:				
Melia, terrace	0-7	17-29	5.6-7.3	0
	7-39	17-29	5.6-7.3	0
	39-76	16-28	5.6-7.8	0-10
	76-80	14-24	6.1-7.8	0-10
824E3:				
Shelby, severely eroded	0-2	20-28	5.1-7.3	0
	2-48	20-30	5.1-7.3	0
	48-62	17-27	6.6-8.4	0-20
	62-80	17-27	6.6-8.4	0-20
Lamoni, severely eroded	0-7	22-31	5.1-7.3	0
	7-14	22-40	5.1-6.5	0
	14-48	21-28	5.1-7.3	0
	48-60	21-28	5.6-7.3	0
870B:				
Sharpsburg, terrace	0-8	22-27	5.1-6.5	0
	8-17	24-27	5.1-6.5	0
	17-38	28-32	5.1-6.5	0
	38-60	18-27	6.1-7.3	0
1239:				
Corley, terrace	0-10	17-23	5.1-7.3	0
	10-18	17-23	5.1-7.3	0
	18-29	17-20	5.1-7.3	0
	29-60	18-25	5.1-6.5	0
	60-68	17-22	5.6-7.3	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	pH	Pct
1239:				
Minden, terrace	0-7	23-27	5.6-7.3	0
	7-22	23-29	5.6-7.3	0
	22-66	23-28	5.6-7.3	0
	66-80	18-22	5.6-7.3	0
2428:				
Ely	0-8	18-30	5.6-7.3	0
	8-32	23-29	5.6-7.3	0
	32-58	22-29	5.6-7.3	0
	58-80	15-28	5.6-7.3	0
Colo, overwash	0-7	17-26	6.1-7.8	0-10
	7-15	17-26	6.1-7.3	0
	15-50	25-29	5.6-7.3	0
	50-70	24-28	5.6-7.3	0
	70-80	20-28	5.6-7.3	0
Mt. Sterling	0-7	15-23	5.6-7.3	0
	7-26	15-24	5.6-7.3	0
	26-54	23-35	4.5-7.3	0
	54-80	23-37	4.5-7.8	0-10
4946C.				
Udorthents-Interstate highway				
5030.				
Pits, limestone quarry				
5040.				
Udorthents, loamy				
5080.				
Udorthents, sanitary landfill				
AW.				
Animal waste lagoon				
SL.				
Sewage lagoon				
W.				
Water				
Y8B:				
Judson	0-9	20-27	4.5-7.3	0
	9-22	20-27	4.5-7.3	0
	22-28	22-27	5.6-7.3	0
	28-35	23-28	5.6-7.3	0
	35-52	20-25	6.1-7.8	0-10
	52-60	17-25	6.1-7.8	0-10
Y8C:				
Judson	0-9	20-27	4.5-7.3	0
	9-22	20-27	4.5-7.3	0
	22-28	22-27	5.6-7.3	0
	28-35	23-28	5.6-7.3	0
	35-52	20-25	6.1-7.8	0-10
	52-60	17-25	6.1-7.8	0-10

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	pH	Pct
Y24C2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Y24D2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Y24D3:				
Shelby, severely eroded	0-2	20-28	5.1-7.3	0
	2-48	20-30	5.1-7.3	0
	48-62	17-27	6.6-8.4	0-20
	62-80	17-27	6.6-8.4	0-20
Y24E:				
Shelby	0-7	20-29	5.1-7.3	0
	7-11	20-29	5.1-7.3	0
	11-46	23-30	5.1-7.3	0
	46-60	17-27	6.6-8.4	0-20
	60-80	17-27	6.6-8.4	0-20
Y24E2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Y24E3:				
Shelby, severely eroded	0-2	20-28	5.1-7.3	0
	2-48	20-30	5.1-7.3	0
	48-62	17-27	6.6-8.4	0-20
	62-80	17-27	6.6-8.4	0-20
Y24F2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Y24F3:				
Shelby, severely eroded	0-2	20-28	5.1-7.3	0
	2-48	20-30	5.1-7.3	0
	48-62	17-27	6.6-8.4	0-20
	62-80	17-27	6.6-8.4	0-20

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	pH	Pct
Y82C3:				
Adair, severely eroded	0-3	20-31	5.1-7.3	0
	3-26	28-43	5.1-6.5	0
	26-59	21-28	5.1-6.5	0
	59-70	21-28	6.1-7.8	0-10
	70-80	21-28	6.1-7.8	0-10
Shelby, severely eroded	0-2	20-28	5.1-7.3	0
	2-48	20-30	5.1-7.3	0
	48-62	17-27	6.6-8.4	0-20
	62-80	17-27	6.6-8.4	0-20
Y93D2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Adair, moderately eroded	0-7	20-31	5.1-7.3	0
	7-17	28-43	5.1-6.5	0
	17-60	21-28	5.1-6.5	0
	60-76	21-28	6.1-7.8	0-10
	76-80	21-28	6.1-7.8	0-10
Y93D3:				
Shelby, severely eroded	0-2	20-28	5.1-7.3	0
	2-48	20-30	5.1-7.3	0
	48-62	17-27	6.6-8.4	0-20
	62-80	17-27	6.6-8.4	0-20
Adair, severely eroded	0-3	20-31	5.1-7.3	0
	3-26	28-43	5.1-6.5	0
	26-59	21-28	5.1-6.5	0
	59-70	21-28	6.1-7.8	0-10
	70-80	21-28	6.1-7.8	0-10
Y93E2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Adair, moderately eroded	0-7	20-31	5.1-7.3	0
	7-17	28-43	5.1-6.5	0
	17-60	21-28	5.1-6.5	0
	60-76	21-28	6.1-8.4	0-20
	76-80	21-28	6.1-7.8	0-10

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	pH	Pct
Y192C2:				
Adair, moderately eroded	0-7	20-31	5.1-7.3	0
	7-17	28-43	5.1-6.5	0
	17-60	21-28	5.1-6.5	0
	60-76	21-28	6.1-7.8	0-10
	76-80	21-28	6.1-7.8	0-10
Y192D2:				
Adair, moderately eroded	0-7	20-31	5.1-7.3	0
	7-17	28-43	5.1-6.5	0
	17-60	21-28	5.1-6.5	0
	60-76	21-28	6.1-7.8	0-10
	76-80	21-28	6.1-7.8	0-10
Y222C2:				
Clarinda, moderately eroded	0-6	21-31	5.1-7.3	0
	6-80	26-42	5.6-8.4	0-20
Y222D2:				
Clarinda, moderately eroded	0-6	21-31	5.1-7.3	0
	6-80	26-42	5.1-7.3	0
Y222D3:				
Clarinda, severely eroded	0-4	31-41	5.1-7.3	0
	4-80	26-42	5.1-7.3	0
Z8B:				
Judson	0-9	20-27	4.5-7.3	0
	9-22	20-27	4.5-7.3	0
	22-28	22-27	5.6-7.3	0
	28-35	23-28	5.6-7.3	0
	35-52	20-25	6.1-7.8	0-10
	52-60	17-25	6.1-7.8	0-10
Z8C:				
Judson	0-9	20-27	4.5-7.3	0
	9-22	20-27	4.5-7.3	0
	22-28	22-27	5.6-7.3	0
	28-35	23-28	5.6-7.3	0
	35-52	20-25	6.1-7.8	0-10
	52-60	17-25	6.1-7.8	0-10
Z24D2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Z24D3:				
Shelby, severely eroded	0-2	20-28	5.1-7.3	0
	2-48	20-30	5.1-7.3	0
	48-62	17-27	6.6-8.4	0-20
	62-80	17-27	6.6-8.4	0-20

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	pH	Pct
Z24E2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Z24E3:				
Shelby, severely eroded	0-2	20-28	5.1-7.3	0
	2-48	20-30	5.1-7.3	0
	48-62	17-27	6.6-8.4	0-20
	62-80	17-27	6.6-8.4	0-20
Z24F2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Z82D3:				
Adair, severely eroded	0-3	20-31	5.1-7.3	0
	3-26	28-43	5.1-6.5	0
	26-59	21-28	5.1-6.5	0
	59-70	21-28	6.1-7.8	0-10
	70-80	21-28	6.1-7.8	0-10
Shelby, severely eroded	0-2	20-28	5.1-7.3	0
	2-48	20-30	5.1-7.3	0
	48-62	17-27	6.6-8.4	0-20
	62-80	17-27	6.6-8.4	0-20
Z93C2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Adair, moderately eroded	0-7	20-31	5.1-7.3	0
	7-17	28-43	5.1-6.5	0
	17-60	21-28	5.1-6.5	0
	60-76	21-28	6.1-7.8	0-10
	76-80	21-28	6.1-7.8	0-10
Z93D2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Adair, moderately eroded	0-7	20-31	5.1-7.3	0
	7-17	28-43	5.1-6.5	0
	17-60	21-28	5.1-6.5	0
	60-76	21-28	6.1-7.8	0-10
	76-80	21-28	6.1-7.8	0-10

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	pH	Pct
Z93E2:				
Shelby, moderately eroded	0-7	20-29	5.1-7.3	0
	7-37	23-30	5.1-7.3	0
	37-45	17-27	6.6-8.4	0-20
	45-80	17-27	6.6-8.4	0-20
Adair, moderately eroded	0-7	20-31	5.1-7.3	0
	7-17	28-43	5.1-6.5	0
	17-60	21-28	5.1-6.5	0
	60-76	21-28	6.1-7.8	0-10
	76-80	21-28	6.1-7.8	0-10
Z192C3:				
Adair, severely eroded	0-3	20-31	5.1-7.3	0
	3-26	28-43	5.1-6.5	0
	26-59	21-28	5.1-6.5	0
	59-70	21-28	6.1-7.8	0-10
	70-80	21-28	6.1-7.8	0-10
Z222D2:				
Clarinda, moderately eroded	0-6	21-31	5.1-7.3	0
	6-80	26-42	5.1-7.3	0

Water Features

The table described in this section gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Water Features

(See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
7:									
Wiota, rarely flooded	C								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	Brief	Rare
		March	4.5-6.5	>6.0	---	---	None	Brief	Rare
		April	4.0-6.0	>6.0	---	---	None	Brief	Rare
		May	4.5-6.5	>6.0	---	---	None	Brief	Rare
		June	5.0-6.7	>6.0	---	---	None	Brief	Rare
		July	6.0-6.7	>6.0	---	---	None	Brief	Rare
		August	6.5-6.7	>6.0	---	---	None	Brief	Rare
		September	6.5-6.7	>6.0	---	---	None	Brief	Rare
		October	6.5-6.7	>6.0	---	---	None	Brief	Rare
		November	5.5-6.7	>6.0	---	---	None	Brief	Rare
		December	6.0-6.7	>6.0	---	---	None	---	None
7B:									
Wiota, rarely flooded	C								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	Brief	Rare
		March	4.5-6.5	>6.0	---	---	None	Brief	Rare
		April	4.0-6.0	>6.0	---	---	None	Brief	Rare
		May	4.5-6.5	>6.0	---	---	None	Brief	Rare
		June	5.0-6.7	>6.0	---	---	None	Brief	Rare
		July	6.0-6.7	>6.0	---	---	None	Brief	Rare
		August	6.5-6.7	>6.0	---	---	None	Brief	Rare
		September	6.5-6.7	>6.0	---	---	None	Brief	Rare
		October	6.5-6.7	>6.0	---	---	None	Brief	Rare
		November	5.5-6.7	>6.0	---	---	None	Brief	Rare
		December	6.0-6.7	>6.0	---	---	None	---	None
9:									
Marshall	C								
		Jan-Dec	---	---	---	---	None	---	None
9B:									
Marshall	C								
		Jan-Dec	---	---	---	---	None	---	None
9C2:									
Marshall, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
9C3:									
Marshall, severely eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
9D2:									
Marshall, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
15B:									
Olmitz	B								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	---	None
		March	4.5-6.5	>6.0	---	---	None	---	None
		April	4.0-6.0	>6.0	---	---	None	---	None
		May	4.5-6.5	>6.0	---	---	None	---	None
		June	5.0-6.7	>6.0	---	---	None	---	None
		July	6.0-6.7	>6.0	---	---	None	---	None
		August	6.5-6.7	>6.0	---	---	None	---	None
		September	6.5-6.7	>6.0	---	---	None	---	None
		October	6.5-6.7	>6.0	---	---	None	---	None
		November	5.5-6.7	>6.0	---	---	None	---	None
		December	6.0-6.7	>6.0	---	---	None	---	None
Ely	B/D								
		January	3.0-5.5	>6.0	---	---	None	---	None
		February	2.5-5.0	>6.0	---	---	None	---	None
		March	1.5-4.0	>6.0	---	---	None	---	None
		April	1.0-3.5	>6.0	---	---	None	---	None
		May	1.5-4.0	>6.0	---	---	None	---	None
		June	2.0-4.5	>6.0	---	---	None	---	None
		July	3.0-5.5	>6.0	---	---	None	---	None
		August	3.5-6.0	>6.0	---	---	None	---	None
		September	4.0-6.5	>6.0	---	---	None	---	None
		October	3.5-6.0	>6.0	---	---	None	---	None
		November	2.5-5.0	>6.0	---	---	None	---	None
		December	3.0-5.5	>6.0	---	---	None	---	None
Zook	D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	---	None
		March	0.5-2.0	>6.0	---	---	None	---	None
		April	0.0-1.0	>6.0	---	---	None	---	None
		May	0.5-1.5	>6.0	---	---	None	---	None
		June	1.0-2.0	>6.0	---	---	None	---	None
		July	2.0-3.0	>6.0	---	---	None	---	None
		August	2.5-3.5	>6.0	---	---	None	---	None
		September	3.0-4.0	>6.0	---	---	None	---	None
		October	2.5-3.5	>6.0	---	---	None	---	None
		November	1.5-3.0	>6.0	---	---	None	---	None
		December	2.0-3.5	>6.0	---	---	None	---	None
16:									
Nodaway, occasionally flooded	B								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	Brief	Occasional
		March	4.5-6.5	>6.0	---	---	None	Brief	Occasional
		April	4.0-6.0	>6.0	---	---	None	Brief	Occasional
		May	4.5-6.5	>6.0	---	---	None	Brief	Occasional
		June	5.0-6.7	>6.0	---	---	None	Brief	Occasional
		July	6.0-6.7	>6.0	---	---	None	Brief	Occasional
		August	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		September	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		October	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		November	5.5-6.7	>6.0	---	---	None	Brief	Occasional
		December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
16:									
Kennebec, occasionally flooded------------------	B								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	Brief	Occasional
		March	4.5-6.5	>6.0	---	---	None	Brief	Occasional
		April	4.0-6.0	>6.0	---	---	None	Brief	Occasional
		May	4.5-6.5	>6.0	---	---	None	Brief	Occasional
		June	5.0-6.7	>6.0	---	---	None	Brief	Occasional
		July	6.0-6.7	>6.0	---	---	None	Brief	Occasional
		August	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		September	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		October	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		November	5.5-6.7	>6.0	---	---	None	Brief	Occasional
		December	6.0-6.7	>6.0	---	---	None	---	None
43:									
Bremer, rarely flooded----	C/D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Brief	Rare
		March	0.5-2.0	>6.0	---	---	None	Brief	Rare
		April	0.0-1.0	>6.0	---	---	None	Brief	Rare
		May	0.5-1.5	>6.0	---	---	None	Brief	Rare
		June	1.0-2.0	>6.0	---	---	None	Brief	Rare
		July	2.0-3.0	>6.0	---	---	None	Brief	Rare
		August	2.5-3.5	>6.0	---	---	None	Brief	Rare
		September	3.0-4.0	>6.0	---	---	None	Brief	Rare
		October	2.5-3.5	>6.0	---	---	None	Brief	Rare
		November	1.5-3.0	>6.0	---	---	None	Brief	Rare
		December	2.0-3.5	>6.0	---	---	None	---	None
54:									
Zook, occasionally flooded	D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		March	0.5-2.0	>6.0	---	---	None	Brief	Occasional
		April	0.0-1.0	>6.0	---	---	None	Brief	Occasional
		May	0.5-1.5	>6.0	---	---	None	Brief	Occasional
		June	1.0-2.0	>6.0	---	---	None	Brief	Occasional
		July	2.0-3.0	>6.0	---	---	None	Brief	Occasional
		August	2.5-3.5	>6.0	---	---	None	Brief	Occasional
		September	3.0-4.0	>6.0	---	---	None	Brief	Occasional
		October	2.5-3.5	>6.0	---	---	None	Brief	Occasional
		November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		December	2.0-3.5	>6.0	---	---	None	---	None
54+:									
Zook, occasionally flooded, overwash--------	C/D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		March	0.5-2.0	>6.0	---	---	None	Brief	Occasional
		April	0.0-1.0	>6.0	---	---	None	Brief	Occasional
		May	0.5-1.5	>6.0	---	---	None	Brief	Occasional
		June	1.0-2.0	>6.0	---	---	None	Brief	Occasional
		July	2.0-3.0	>6.0	---	---	None	Brief	Occasional
		August	2.5-3.5	>6.0	---	---	None	Brief	Occasional
		September	3.0-4.0	>6.0	---	---	None	Brief	Occasional
		October	2.5-3.5	>6.0	---	---	None	Brief	Occasional
		November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
88:									
Nevin, rarely flooded	C/D								
		January	3.0-5.5	>6.0	---	---	None	---	None
		February	2.5-5.0	>6.0	---	---	None	Brief	Rare
		March	1.5-4.0	>6.0	---	---	None	Brief	Rare
		April	1.0-3.5	>6.0	---	---	None	Brief	Rare
		May	1.5-4.0	>6.0	---	---	None	Brief	Rare
		June	2.0-4.5	>6.0	---	---	None	Brief	Rare
		July	3.0-5.5	>6.0	---	---	None	Brief	Rare
		August	3.5-6.0	>6.0	---	---	None	Brief	Rare
		September	4.0-6.5	>6.0	---	---	None	Brief	Rare
		October	3.5-6.0	>6.0	---	---	None	Brief	Rare
		November	2.5-5.0	>6.0	---	---	None	Brief	Rare
		December	3.0-5.5	>6.0	---	---	None	---	None
99D2:									
Exira, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
99D3:									
Exira, severely eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
99E2:									
Exira, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
99E3:									
Exira, severely eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
113B:									
Colo, frequently flooded, overwash	C/D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Very brief	Frequent
		March	0.5-2.0	>6.0	---	---	None	Very brief	Frequent
		April	0.0-1.0	>6.0	---	---	None	Very brief	Frequent
		May	0.5-1.5	>6.0	---	---	None	Very brief	Frequent
		June	1.0-2.0	>6.0	---	---	None	Very brief	Frequent
		July	2.0-3.0	>6.0	---	---	None	Very brief	Frequent
		August	2.5-3.5	>6.0	---	---	None	Very brief	Frequent
		September	3.0-4.0	>6.0	---	---	None	Very brief	Frequent
		October	2.5-3.5	>6.0	---	---	None	Very brief	Frequent
		November	1.5-3.0	>6.0	---	---	None	Very brief	Frequent
		December	2.0-3.5	>6.0	---	---	None	---	None
Ely	B/D								
		January	3.0-5.5	>6.0	---	---	None	---	None
		February	2.5-5.0	>6.0	---	---	None	---	None
		March	1.5-4.0	>6.0	---	---	None	---	None
		April	1.0-3.5	>6.0	---	---	None	---	None
		May	1.5-4.0	>6.0	---	---	None	---	None
		June	2.0-4.5	>6.0	---	---	None	---	None
		July	3.0-5.5	>6.0	---	---	None	---	None
		August	3.5-6.0	>6.0	---	---	None	---	None
		September	4.0-6.5	>6.0	---	---	None	---	None
		October	3.5-6.0	>6.0	---	---	None	---	None
		November	2.5-5.0	>6.0	---	---	None	---	None
		December	3.0-5.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
136: Ankeny, occasionally flooded	A								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	Brief	Occasional
		March	---	---	---	---	None	Brief	Occasional
		April	---	---	---	---	None	Brief	Occasional
		May	---	---	---	---	None	Brief	Occasional
		June	---	---	---	---	None	Brief	Occasional
		July	---	---	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
		November	---	---	---	---	None	Brief	Occasional
		December	---	---	---	---	None	---	None
212: Kennebec, occasionally flooded	B								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	Brief	Occasional
		March	4.5-6.5	>6.0	---	---	None	Brief	Occasional
		April	4.0-6.0	>6.0	---	---	None	Brief	Occasional
		May	4.5-6.5	>6.0	---	---	None	Brief	Occasional
		June	5.0-6.7	>6.0	---	---	None	Brief	Occasional
		July	6.0-6.7	>6.0	---	---	None	Brief	Occasional
		August	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		September	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		October	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		November	5.5-6.7	>6.0	---	---	None	Brief	Occasional
		December	6.0-6.7	>6.0	---	---	None	---	None
220: Nodaway, occasionally flooded	B								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	Brief	Occasional
		March	4.5-6.5	>6.0	---	---	None	Brief	Occasional
		April	4.0-6.0	>6.0	---	---	None	Brief	Occasional
		May	4.5-6.5	>6.0	---	---	None	Brief	Occasional
		June	5.0-6.7	>6.0	---	---	None	Brief	Occasional
		July	6.0-6.7	>6.0	---	---	None	Brief	Occasional
		August	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		September	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		October	6.5-6.7	>6.0	---	---	None	Brief	Occasional
		November	5.5-6.7	>6.0	---	---	None	Brief	Occasional
		December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
229C2:									
Clarinda, moderately eroded	D								
		January	---	---	---	---	None	---	None
		February	1.5-2.0	2.0	---	---	None	---	None
		March	0.0-1.0	2.0	---	---	None	---	None
		April	0.0-1.0	2.0	---	---	None	---	None
		May	0.5-1.5	2.0	---	---	None	---	None
		June	1.0-1.5	2.0	---	---	None	---	None
		July	1.5-2.0	2.0	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.0	---	---	None	---	None
		November	1.5-2.0	2.0	---	---	None	---	None
		December	1.5-2.0	2.0	---	---	None	---	None
Clarinda, severely eroded	D								
		January	---	---	---	---	None	---	None
		February	1.5-2.0	2.0	---	---	None	---	None
		March	0.0-1.0	2.0	---	---	None	---	None
		April	0.0-1.0	2.0	---	---	None	---	None
		May	0.5-1.5	2.0	---	---	None	---	None
		June	1.0-1.5	2.0	---	---	None	---	None
		July	1.5-2.0	2.0	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.0	---	---	None	---	None
		November	1.5-2.0	2.0	---	---	None	---	None
		December	1.5-2.0	2.0	---	---	None	---	None
229D2:									
Clarinda, moderately eroded	D								
		January	---	---	---	---	None	---	None
		February	1.5-2.0	2.0	---	---	None	---	None
		March	0.0-1.0	2.0	---	---	None	---	None
		April	0.0-1.0	2.0	---	---	None	---	None
		May	0.5-1.5	2.0	---	---	None	---	None
		June	1.0-1.5	2.0	---	---	None	---	None
		July	1.5-2.0	2.0	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.0	---	---	None	---	None
		November	1.5-2.0	2.0	---	---	None	---	None
		December	1.5-2.0	2.0	---	---	None	---	None
Clarinda, severely eroded	D								
		January	---	---	---	---	None	---	None
		February	1.5-2.0	2.0	---	---	None	---	None
		March	0.0-1.0	2.0	---	---	None	---	None
		April	0.0-1.0	2.0	---	---	None	---	None
		May	0.5-1.5	2.0	---	---	None	---	None
		June	1.0-1.5	2.0	---	---	None	---	None
		July	1.5-2.0	2.0	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.0	---	---	None	---	None
		November	1.5-2.0	2.0	---	---	None	---	None
		December	1.5-2.0	2.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
247D2:									
Shelby, sandy substratum, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Hesch, deep, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Hesch, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
269:									
Humeston, occasionally flooded, occasionally ponded	C/D								
		January	0.0	>6.0	---	---	None	---	None
		February	0.0	>6.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		March	0.0	>6.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		April	0.0	>6.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		May	0.0	>6.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		June	0.0	>6.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		July	0.0	>6.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		August	0.0	>6.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		September	0.0	>6.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		October	0.0	>6.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		November	0.0	>6.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		December	0.0	>6.0	---	---	None	---	None
273B:									
Olmitz	C								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	---	None
		March	4.5-6.5	>6.0	---	---	None	---	None
		April	4.0-6.0	>6.0	---	---	None	---	None
		May	4.5-6.5	>6.0	---	---	None	---	None
		June	5.0-6.7	>6.0	---	---	None	---	None
		July	6.0-6.7	>6.0	---	---	None	---	None
		August	6.5-6.7	>6.0	---	---	None	---	None
		September	6.5-6.7	>6.0	---	---	None	---	None
		October	6.5-6.7	>6.0	---	---	None	---	None
		November	5.5-6.7	>6.0	---	---	None	---	None
		December	6.0-6.7	>6.0	---	---	None	---	None
289D2:									
Dickman, loamy substratum, moderately eroded	A								
		Jan-Dec	---	---	---	---	None	---	None
Marshall, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
300:									
Bremer, terrace	C/D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	---	None
		March	0.5-2.0	>6.0	---	---	None	---	None
		April	0.0-1.0	>6.0	---	---	None	---	None
		May	0.5-1.5	>6.0	---	---	None	---	None
		June	1.0-2.0	>6.0	---	---	None	---	None
		July	2.0-3.0	>6.0	---	---	None	---	None
		August	2.5-3.5	>6.0	---	---	None	---	None
		September	3.0-4.0	>6.0	---	---	None	---	None
		October	2.5-3.5	>6.0	---	---	None	---	None
		November	1.5-3.0	>6.0	---	---	None	---	None
		December	2.0-3.5	>6.0	---	---	None	---	None
337D2:									
Dickman, loamy substratum, moderately eroded	A								
		Jan-Dec	---	---	---	---	None	---	None
Sharpsburg, moderately eroded	C								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	---	None
		March	4.5-6.5	>6.0	---	---	None	---	None
		April	4.0-6.0	>6.0	---	---	None	---	None
		May	4.5-6.5	>6.0	---	---	None	---	None
		June	5.0-6.7	>6.0	---	---	None	---	None
		July	6.0-6.7	>6.0	---	---	None	---	None
		August	6.5-6.7	>6.0	---	---	None	---	None
		September	6.5-6.7	>6.0	---	---	None	---	None
		October	6.5-6.7	>6.0	---	---	None	---	None
		November	5.5-6.7	>6.0	---	---	None	---	None
		December	6.0-6.7	>6.0	---	---	None	---	None
370:									
Sharpsburg	C								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	---	None
		March	4.5-6.5	>6.0	---	---	None	---	None
		April	4.0-6.0	>6.0	---	---	None	---	None
		May	4.5-6.5	>6.0	---	---	None	---	None
		June	5.0-6.7	>6.0	---	---	None	---	None
		July	6.0-6.7	>6.0	---	---	None	---	None
		August	6.5-6.7	>6.0	---	---	None	---	None
		September	6.5-6.7	>6.0	---	---	None	---	None
		October	6.5-6.7	>6.0	---	---	None	---	None
		November	5.5-6.7	>6.0	---	---	None	---	None
		December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
370B:									
Sharpsburg	C								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	---	None
		March	4.5-6.5	>6.0	---	---	None	---	None
		April	4.0-6.0	>6.0	---	---	None	---	None
		May	4.5-6.5	>6.0	---	---	None	---	None
		June	5.0-6.7	>6.0	---	---	None	---	None
		July	6.0-6.7	>6.0	---	---	None	---	None
		August	6.5-6.7	>6.0	---	---	None	---	None
		September	6.5-6.7	>6.0	---	---	None	---	None
		October	6.5-6.7	>6.0	---	---	None	---	None
		November	5.5-6.7	>6.0	---	---	None	---	None
		December	6.0-6.7	>6.0	---	---	None	---	None
371C2:									
Sharpsburg, moderately eroded	C								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	---	None
		March	4.5-6.5	>6.0	---	---	None	---	None
		April	4.0-6.0	>6.0	---	---	None	---	None
		May	4.5-6.5	>6.0	---	---	None	---	None
		June	5.0-6.7	>6.0	---	---	None	---	None
		July	6.0-6.7	>6.0	---	---	None	---	None
		August	6.5-6.7	>6.0	---	---	None	---	None
		September	6.5-6.7	>6.0	---	---	None	---	None
		October	6.5-6.7	>6.0	---	---	None	---	None
		November	5.5-6.7	>6.0	---	---	None	---	None
		December	6.0-6.7	>6.0	---	---	None	---	None
Nira, moderately eroded	C								
		January	4.0-6.0	>6.0	---	---	None	---	None
		February	3.5-5.5	>6.0	---	---	None	---	None
		March	2.5-4.5	>6.0	---	---	None	---	None
		April	2.0-4.0	>6.0	---	---	None	---	None
		May	2.5-4.5	>6.0	---	---	None	---	None
		June	3.0-5.0	>6.0	---	---	None	---	None
		July	4.0-6.0	>6.0	---	---	None	---	None
		August	4.5-6.5	>6.0	---	---	None	---	None
		September	5.0-6.7	>6.0	---	---	None	---	None
		October	4.5-6.5	>6.0	---	---	None	---	None
		November	3.5-5.5	>6.0	---	---	None	---	None
		December	4.0-6.0	>6.0	---	---	None	---	None
371D2:									
Sharpsburg	C								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	---	None
		March	4.5-6.5	>6.0	---	---	None	---	None
		April	4.0-6.0	>6.0	---	---	None	---	None
		May	4.5-6.5	>6.0	---	---	None	---	None
		June	5.0-6.7	>6.0	---	---	None	---	None
		July	6.0-6.7	>6.0	---	---	None	---	None
		August	6.5-6.7	>6.0	---	---	None	---	None
		September	6.5-6.7	>6.0	---	---	None	---	None
		October	6.5-6.7	>6.0	---	---	None	---	None
		November	5.5-6.7	>6.0	---	---	None	---	None
		December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
371D2:									
Sharpsburg, moderately eroded	C								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	---	None
		March	4.5-6.5	>6.0	---	---	None	---	None
		April	4.0-6.0	>6.0	---	---	None	---	None
		May	4.5-6.5	>6.0	---	---	None	---	None
		June	5.0-6.7	>6.0	---	---	None	---	None
		July	6.0-6.7	>6.0	---	---	None	---	None
		August	6.5-6.7	>6.0	---	---	None	---	None
		September	6.5-6.7	>6.0	---	---	None	---	None
		October	6.5-6.7	>6.0	---	---	None	---	None
		November	5.5-6.7	>6.0	---	---	None	---	None
		December	6.0-6.7	>6.0	---	---	None	---	None
Nira, moderately eroded	C								
		January	4.0-6.0	>6.0	---	---	None	---	None
		February	3.5-5.5	>6.0	---	---	None	---	None
		March	2.5-4.5	>6.0	---	---	None	---	None
		April	2.0-4.0	>6.0	---	---	None	---	None
		May	2.5-4.5	>6.0	---	---	None	---	None
		June	3.0-5.0	>6.0	---	---	None	---	None
		July	4.0-6.0	>6.0	---	---	None	---	None
		August	4.5-6.5	>6.0	---	---	None	---	None
		September	5.0-6.7	>6.0	---	---	None	---	None
		October	4.5-6.5	>6.0	---	---	None	---	None
		November	3.5-5.5	>6.0	---	---	None	---	None
		December	4.0-6.0	>6.0	---	---	None	---	None
371E2:									
Sharpsburg, moderately eroded	C								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	---	None
		March	4.5-6.5	>6.0	---	---	None	---	None
		April	4.0-6.0	>6.0	---	---	None	---	None
		May	4.5-6.5	>6.0	---	---	None	---	None
		June	5.0-6.7	>6.0	---	---	None	---	None
		July	6.0-6.7	>6.0	---	---	None	---	None
		August	6.5-6.7	>6.0	---	---	None	---	None
		September	6.5-6.7	>6.0	---	---	None	---	None
		October	6.5-6.7	>6.0	---	---	None	---	None
		November	5.5-6.7	>6.0	---	---	None	---	None
		December	6.0-6.7	>6.0	---	---	None	---	None
Nira, moderately eroded	C								
		January	4.0-6.0	>6.0	---	---	None	---	None
		February	3.5-5.5	>6.0	---	---	None	---	None
		March	2.5-4.5	>6.0	---	---	None	---	None
		April	2.0-4.0	>6.0	---	---	None	---	None
		May	2.5-4.5	>6.0	---	---	None	---	None
		June	3.0-5.0	>6.0	---	---	None	---	None
		July	4.0-6.0	>6.0	---	---	None	---	None
		August	4.5-6.5	>6.0	---	---	None	---	None
		September	5.0-6.7	>6.0	---	---	None	---	None
		October	4.5-6.5	>6.0	---	---	None	---	None
		November	3.5-5.5	>6.0	---	---	None	---	None
		December	4.0-6.0	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
430:									
Ackmore, occasionally flooded	C/D								
		January	3.0-5.5	>6.0	---	---	None	---	None
		February	2.5-5.0	>6.0	---	---	None	Brief	Occasional
		March	1.5-4.0	>6.0	---	---	None	Brief	Occasional
		April	1.0-3.5	>6.0	---	---	None	Brief	Occasional
		May	1.5-4.0	>6.0	---	---	None	Brief	Occasional
		June	2.0-4.5	>6.0	---	---	None	Brief	Occasional
		July	3.0-5.5	>6.0	---	---	None	Brief	Occasional
		August	3.5-6.0	>6.0	---	---	None	Brief	Occasional
		September	4.0-6.5	>6.0	---	---	None	Brief	Occasional
		October	3.5-6.0	>6.0	---	---	None	Brief	Occasional
		November	2.5-5.0	>6.0	---	---	None	Brief	Occasional
		December	3.0-5.5	>6.0	---	---	None	---	None
431B:									
Judson	C								
		Jan-Dec	---	---	---	---	None	---	None
Ackmore, rarely flooded	C/D								
		January	3.0-5.5	>6.0	---	---	None	---	None
		February	2.5-5.0	>6.0	---	---	None	Very brief	Rare
		March	1.5-4.0	>6.0	---	---	None	Very brief	Rare
		April	1.0-3.5	>6.0	---	---	None	Very brief	Rare
		May	1.5-4.0	>6.0	---	---	None	Very brief	Rare
		June	2.0-4.5	>6.0	---	---	None	Very brief	Rare
		July	3.0-5.5	>6.0	---	---	None	Very brief	Rare
		August	3.5-6.0	>6.0	---	---	None	Very brief	Rare
		September	4.0-6.5	>6.0	---	---	None	Very brief	Rare
		October	3.5-6.0	>6.0	---	---	None	Very brief	Rare
		November	2.5-5.0	>6.0	---	---	None	Very brief	Rare
		December	3.0-5.5	>6.0	---	---	None	---	None
Colo, frequently flooded, overwash	C/D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Very brief	Frequent
		March	0.5-2.0	>6.0	---	---	None	Very brief	Frequent
		April	0.0-1.0	>6.0	---	---	None	Very brief	Frequent
		May	0.5-1.5	>6.0	---	---	None	Very brief	Frequent
		June	1.0-2.0	>6.0	---	---	None	Very brief	Frequent
		July	2.0-3.0	>6.0	---	---	None	Very brief	Frequent
		August	2.5-3.5	>6.0	---	---	None	Very brief	Frequent
		September	3.0-4.0	>6.0	---	---	None	Very brief	Frequent
		October	2.5-3.5	>6.0	---	---	None	Very brief	Frequent
		November	1.5-3.0	>6.0	---	---	None	Very brief	Frequent
		December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
435:									
Zook, occasionally flooded	D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		March	0.5-2.0	>6.0	---	---	None	Brief	Occasional
		April	0.0-1.0	>6.0	---	---	None	Brief	Occasional
		May	0.5-1.5	>6.0	---	---	None	Brief	Occasional
		June	1.0-2.0	>6.0	---	---	None	Brief	Occasional
		July	2.0-3.0	>6.0	---	---	None	Brief	Occasional
		August	2.5-3.5	>6.0	---	---	None	Brief	Occasional
		September	3.0-4.0	>6.0	---	---	None	Brief	Occasional
		October	2.5-3.5	>6.0	---	---	None	Brief	Occasional
		November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		December	2.0-3.5	>6.0	---	---	None	---	None
Mt. Sterling, occasionally flooded-----	C/D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		March	0.5-2.0	>6.0	---	---	None	Brief	Occasional
		April	0.0-1.0	>6.0	---	---	None	Brief	Occasional
		May	0.5-1.5	>6.0	---	---	None	Brief	Occasional
		June	1.0-2.0	>6.0	---	---	None	Brief	Occasional
		July	2.0-3.0	>6.0	---	---	None	Brief	Occasional
		August	2.5-3.5	>6.0	---	---	None	Brief	Occasional
		September	3.0-4.0	>6.0	---	---	None	Brief	Occasional
		October	2.5-3.5	>6.0	---	---	None	Brief	Occasional
		November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		December	2.0-3.5	>6.0	---	---	None	---	None
469C2:									
Lamoni, moderately eroded	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Clarinda, moderately eroded-------------------	D								
		January	---	---	---	---	None	---	None
		February	1.5-2.0	2.0	---	---	None	---	None
		March	0.0-1.0	2.0	---	---	None	---	None
		April	0.0-1.0	2.0	---	---	None	---	None
		May	0.5-1.5	2.0	---	---	None	---	None
		June	1.0-1.5	2.0	---	---	None	---	None
		July	1.5-2.0	2.0	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.0	---	---	None	---	None
		November	1.5-2.0	2.0	---	---	None	---	None
		December	1.5-2.0	2.0	---	---	None	---	None
Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
469C3:									
Lamoni, severely eroded	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Clarinda, severely eroded	D								
		January	---	---	---	---	None	---	None
		February	1.5-2.0	2.0	---	---	None	---	None
		March	0.0-1.0	2.0	---	---	None	---	None
		April	0.0-1.0	2.0	---	---	None	---	None
		May	0.5-1.5	2.0	---	---	None	---	None
		June	1.0-1.5	2.0	---	---	None	---	None
		July	1.5-2.0	2.0	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.0	---	---	None	---	None
		November	1.5-2.0	2.0	---	---	None	---	None
		December	1.5-2.0	2.0	---	---	None	---	None
Shelby, severely eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
470D2:									
Lamoni, moderately eroded	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
509B:									
Marshall, terrace	C								
		Jan-Dec	---	---	---	---	None	---	None
509C:									
Marshall, terrace	C								
		Jan-Dec	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
509C2:									
Marshall, terrace, moderately eroded	B								
		Jan-Dec	---	---	---	---	None	---	None
545B:									
Zook	D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	---	None
		March	0.5-2.0	>6.0	---	---	None	---	None
		April	0.0-1.0	>6.0	---	---	None	---	None
		May	0.5-1.5	>6.0	---	---	None	---	None
		June	1.0-2.0	>6.0	---	---	None	---	None
		July	2.0-3.0	>6.0	---	---	None	---	None
		August	2.5-3.5	>6.0	---	---	None	---	None
		September	3.0-4.0	>6.0	---	---	None	---	None
		October	2.5-3.5	>6.0	---	---	None	---	None
		November	1.5-3.0	>6.0	---	---	None	---	None
		December	2.0-3.5	>6.0	---	---	None	---	None
Ely	B/D								
		January	3.0-5.5	>6.0	---	---	None	---	None
		February	2.5-5.0	>6.0	---	---	None	---	None
		March	1.5-4.0	>6.0	---	---	None	---	None
		April	1.0-3.5	>6.0	---	---	None	---	None
		May	1.5-4.0	>6.0	---	---	None	---	None
		June	2.0-4.5	>6.0	---	---	None	---	None
		July	3.0-5.5	>6.0	---	---	None	---	None
		August	3.5-6.0	>6.0	---	---	None	---	None
		September	4.0-6.5	>6.0	---	---	None	---	None
		October	3.5-6.0	>6.0	---	---	None	---	None
		November	2.5-5.0	>6.0	---	---	None	---	None
		December	3.0-5.5	>6.0	---	---	None	---	None
Gullied land.									
733:									
Calco, occasionally flooded	C/D								
		January	0.0-1.0	>6.0	---	---	None	---	None
		February	0.0-1.0	>6.0	---	---	None	Brief	Occasional
		March	0.0-1.0	>6.0	---	---	None	Brief	Occasional
		April	0.0-1.0	>6.0	---	---	None	Brief	Occasional
		May	0.0-1.0	>6.0	---	---	None	Brief	Occasional
		June	0.0-1.0	>6.0	---	---	None	Brief	Occasional
		July	0.0-1.0	>6.0	---	---	None	Brief	Occasional
		August	0.0-6.0	>6.0	---	---	None	Brief	Occasional
		September	0.0-6.0	>6.0	---	---	None	Brief	Occasional
		October	0.0-6.0	>6.0	---	---	None	Brief	Occasional
		November	0.0-1.0	>6.0	---	---	None	Brief	Occasional
		December	0.0-1.0	>6.0	---	---	None	---	None
803:									
Melia, terrace	C								
		Jan-Dec	---	---	---	---	None	---	None
824E3:									
Shelby, severely eroded	C								
		Jan-Dec	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
824E3:									
Lamoni, severely eroded---	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
870B:									
Sharpsburg, terrace-------	C								
		January	6.0-6.7	>6.0	---	---	None	---	None
		February	5.5-6.7	>6.0	---	---	None	---	None
		March	4.5-6.5	>6.0	---	---	None	---	None
		April	4.0-6.0	>6.0	---	---	None	---	None
		May	4.5-6.5	>6.0	---	---	None	---	None
		June	5.0-6.7	>6.0	---	---	None	---	None
		July	6.0-6.7	>6.0	---	---	None	---	None
		August	6.5-6.7	>6.0	---	---	None	---	None
		September	6.5-6.7	>6.0	---	---	None	---	None
		October	6.5-6.7	>6.0	---	---	None	---	None
		November	5.5-6.7	>6.0	---	---	None	---	None
		December	6.0-6.7	>6.0	---	---	None	---	None
1239:									
Corley, terrace-----------	C/D								
		January	0.0	>6.0	---	---	---	---	None
		February	0.0	>6.0	0.0-1.0	Brief	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Brief	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Brief	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Brief	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Brief	Frequent	---	None
		July	0.0	>6.0	0.0-1.0	Brief	Frequent	---	None
		August	0.0	>6.0	0.0-1.0	Brief	Frequent	---	None
		September	0.0	>6.0	0.0-1.0	Brief	Frequent	---	None
		October	0.0	>6.0	0.0-1.0	Brief	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Brief	Frequent	---	None
		December	0.0	>6.0	---	---	---	---	None
Minden, terrace-----------	C/D								
		January	3.0-5.5	>6.0	---	---	None	---	None
		February	2.5-5.0	>6.0	---	---	None	---	None
		March	1.5-4.0	>6.0	---	---	None	---	None
		April	1.0-3.5	>6.0	---	---	None	---	None
		May	1.5-4.0	>6.0	---	---	None	---	None
		June	2.0-4.5	>6.0	---	---	None	---	None
		July	3.0-5.5	>6.0	---	---	None	---	None
		August	3.5-6.0	>6.0	---	---	None	---	None
		September	4.0-6.5	>6.0	---	---	None	---	None
		October	3.5-6.0	>6.0	---	---	None	---	None
		November	2.5-5.0	>6.0	---	---	None	---	None
		December	3.0-5.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
2428:									
Ely	B/D								
		January	3.0-5.5	>6.0	---	---	None	---	None
		February	2.5-5.0	>6.0	---	---	None	---	None
		March	1.5-4.0	>6.0	---	---	None	---	None
		April	1.0-3.5	>6.0	---	---	None	---	None
		May	1.5-4.0	>6.0	---	---	None	---	None
		June	2.0-4.5	>6.0	---	---	None	---	None
		July	3.0-5.5	>6.0	---	---	None	---	None
		August	3.5-6.0	>6.0	---	---	None	---	None
		September	4.0-6.5	>6.0	---	---	None	---	None
		October	3.5-6.0	>6.0	---	---	None	---	None
		November	2.5-5.0	>6.0	---	---	None	---	None
		December	3.0-5.5	>6.0	---	---	None	---	None
Colo, overwash	C/D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Very brief	Frequent
		March	0.5-2.0	>6.0	---	---	None	Very brief	Frequent
		April	0.0-1.0	>6.0	---	---	None	Very brief	Frequent
		May	0.5-1.5	>6.0	---	---	None	Very brief	Frequent
		June	1.0-2.0	>6.0	---	---	None	Very brief	Frequent
		July	2.0-3.0	>6.0	---	---	None	Very brief	Frequent
		August	2.5-3.5	>6.0	---	---	None	Very brief	Frequent
		September	3.0-4.0	>6.0	---	---	None	Very brief	Frequent
		October	2.5-3.5	>6.0	---	---	None	Very brief	Frequent
		November	1.5-3.0	>6.0	---	---	None	Very brief	Frequent
		December	2.0-3.5	>6.0	---	---	None	---	None
Mt. Sterling	C/D								
		January	2.0-3.5	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Very brief	Frequent
		March	0.5-2.0	>6.0	---	---	None	Very brief	Frequent
		April	0.0-1.0	>6.0	---	---	None	Very brief	Frequent
		May	0.5-1.5	>6.0	---	---	None	Very brief	Frequent
		June	1.0-2.0	>6.0	---	---	None	Very brief	Frequent
		July	2.0-3.0	>6.0	---	---	None	Very brief	Frequent
		August	2.5-3.5	>6.0	---	---	None	Very brief	Frequent
		September	3.0-4.0	>6.0	---	---	None	Very brief	Frequent
		October	2.5-3.5	>6.0	---	---	None	Very brief	Frequent
		November	1.5-3.0	>6.0	---	---	None	Very brief	Frequent
		December	2.0-3.5	>6.0	---	---	None	---	None
4946C. Udorthents-Interstate highway									
5030. Pits, limestone quarry									
5040. Udorthents, loamy									
5080. Udorthents, sanitary landfill									
AW. Animal waste lagoon									
SL. Sewage lagoon									

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
W. Water									
Y8B: Judson	C								
		Jan-Dec	---	---	---	---	None	---	None
Y8C: Judson	C								
		Jan-Dec	---	---	---	---	None	---	None
Y24C2: Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Y24D2: Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Y24D3: Shelby, severely eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Y24E: Shelby	C								
		Jan-Dec	---	---	---	---	None	---	None
Y24E2: Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Y24E3: Shelby, severely eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Y24F2: Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Y24F3: Shelby, severely eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Y82C3: Adair, severely eroded	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Shelby, severely eroded	C								
		Jan-Dec	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
Y93D2:									
Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Adair, moderately eroded--	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Y93D3:									
Shelby, severely eroded---	C								
		Jan-Dec	---	---	---	---	None	---	None
Adair, severely eroded----	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Y93E2:									
Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Adair, moderately eroded--	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
Y192C2:									
Adair, moderately eroded--	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Y192D2:									
Adair, moderately eroded--	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Y222C2:									
Clarinda, moderately eroded-------------------	D								
		January	---	---	---	---	None	---	None
		February	1.5-2.0	2.0	---	---	None	---	None
		March	0.0-1.0	2.0	---	---	None	---	None
		April	0.0-1.0	2.0	---	---	None	---	None
		May	0.5-1.5	2.0	---	---	None	---	None
		June	1.0-1.5	2.0	---	---	None	---	None
		July	1.5-2.0	2.0	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.0	---	---	None	---	None
		November	1.5-2.0	2.0	---	---	None	---	None
		December	1.5-2.0	2.0	---	---	None	---	None
Y222D2:									
Clarinda, moderately eroded-------------------	D								
		January	---	---	---	---	None	---	None
		February	1.5-2.0	2.0	---	---	None	---	None
		March	0.0-1.0	2.0	---	---	None	---	None
		April	0.0-1.0	2.0	---	---	None	---	None
		May	0.5-1.5	2.0	---	---	None	---	None
		June	1.0-1.5	2.0	---	---	None	---	None
		July	1.5-2.0	2.0	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.0	---	---	None	---	None
		November	1.5-2.0	2.0	---	---	None	---	None
		December	1.5-2.0	2.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
Y222D3:									
Clarinda, severely eroded	D								
		January	---	---	---	---	None	---	None
		February	1.5-2.0	2.0	---	---	None	---	None
		March	0.0-1.0	2.0	---	---	None	---	None
		April	0.0-1.0	2.0	---	---	None	---	None
		May	0.5-1.5	2.0	---	---	None	---	None
		June	1.0-1.5	2.0	---	---	None	---	None
		July	1.5-2.0	2.0	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.0	---	---	None	---	None
		November	1.5-2.0	2.0	---	---	None	---	None
		December	1.5-2.0	2.0	---	---	None	---	None
Z8B:									
Judson---------------------	C								
		Jan-Dec	---	---	---	---	None	---	None
Z8C:									
Judson---------------------	C								
		Jan-Dec	---	---	---	---	None	---	None
Z24D2:									
Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Z24D3:									
Shelby, severely eroded---	C								
		Jan-Dec	---	---	---	---	None	---	None
Z24E2:									
Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Z24E3:									
Shelby, severely eroded---	C								
		Jan-Dec	---	---	---	---	None	---	None
Z24F2:									
Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Z82D3:									
Adair, severely eroded----	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Shelby, severely eroded---	C								
		Jan-Dec	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
Z93C2:									
Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Adair, moderately eroded--	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Z93D2:									
Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Adair, moderately eroded--	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Z93E2:									
Shelby, moderately eroded	C								
		Jan-Dec	---	---	---	---	None	---	None
Adair, moderately eroded--	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
Z192C3:									
Adair, severely eroded	D								
		January	---	---	---	---	None	---	None
		February	---	---	---	---	None	---	None
		March	1.5-2.0	2.5	---	---	None	---	None
		April	1.5-2.0	2.5	---	---	None	---	None
		May	1.5-2.0	2.5	---	---	None	---	None
		June	2.0-2.5	2.5	---	---	None	---	None
		July	---	---	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.5	---	---	None	---	None
		November	1.5-2.0	2.5	---	---	None	---	None
		December	1.5-2.0	2.5	---	---	None	---	None
Z222D2:									
Clarinda, moderately eroded	D								
		January	---	---	---	---	None	---	None
		February	1.5-2.0	2.0	---	---	None	---	None
		March	0.0-1.0	2.0	---	---	None	---	None
		April	0.0-1.0	2.0	---	---	None	---	None
		May	0.5-1.5	2.0	---	---	None	---	None
		June	1.0-1.5	2.0	---	---	None	---	None
		July	1.5-2.0	2.0	---	---	None	---	None
		August	---	---	---	---	None	---	None
		September	---	---	---	---	None	---	None
		October	1.0-1.5	2.0	---	---	None	---	None
		November	1.5-2.0	2.0	---	---	None	---	None
		December	1.5-2.0	2.0	---	---	None	---	None

Soil Features

The table described in this section gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness of the restrictive layer, which significantly affects the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
7:						
Wiota, rarely flooded	---	---	---	High	High	Moderate
7B:						
Wiota, rarely flooded	---	---	---	High	High	Moderate
9:						
Marshall	---	---	---	High	Moderate	Moderate
9B:						
Marshall	---	---	---	High	Moderate	Moderate
9C2:						
Marshall, moderately eroded	---	---	---	High	Moderate	Low
9C3:						
Marshall, severely eroded	---	---	---	High	Moderate	Low
9D2:						
Marshall, moderately eroded	---	---	---	High	Moderate	Low
15B:						
Olmitz	---	---	---	Moderate	High	Low
Ely	---	---	---	High	High	Low
Zook	---	---	---	High	High	Low
16:						
Nodaway, occasionally flooded	---	---	---	High	High	Low
Kennebec, occasionally flooded	---	---	---	High	Moderate	Low
43:						
Bremer, rarely flooded	---	---	---	High	High	Low
54:						
Zook, occasionally flooded	---	---	---	High	High	Low
54+:						
Zook, occasionally flooded, overwash	---	---	---	High	High	Low
88:						
Nevin, rarely flooded	---	---	---	High	High	Moderate
99D2:						
Exira, moderately eroded	---	---	---	High	Moderate	Moderate
99D3:						
Exira, severely eroded	---	---	---	High	Moderate	Moderate
99E2:						
Exira, moderately eroded	---	---	---	High	Moderate	Moderate
99E3:						
Exira, severely eroded	---	---	---	High	Moderate	Moderate

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
113B:						
Colo, frequently flooded, overwash	---	---	---	High	High	Low
Ely	---	---	---	High	High	Low
136:						
Ankeny, occasionally flooded	---	---	---	Moderate	Low	Low
212:						
Kennebec, occasionally flooded	---	---	---	High	Moderate	Low
220:						
Nodaway, occasionally flooded	---	---	---	High	High	Low
229C2:						
Clarinda, moderately eroded	Abrupt textural change	6	---	High	High	Low
Clarinda, severely eroded	Abrupt textural change	4	---	High	High	Low
229D2:						
Clarinda, moderately eroded	Abrupt textural change	6	---	High	High	Low
Clarinda, severely eroded	Abrupt textural change	4	---	High	High	Low
247D2:						
Shelby, sandy substratum, moderately eroded	---	---	---	Moderate	Low	Moderate
Hesch, deep, moderately eroded	Paralithic bedrock	52	Extremely weakly cemented	Moderate	Low	Low
Hesch, moderately eroded	Paralithic bedrock	30	Extremely weakly cemented	Moderate	Low	Moderate
269:						
Humeston, occasionally flooded, occasionally ponded	---	---	---	High	Moderate	Low
273B:						
Olmitz	---	---	---	Moderate	High	Low
289D2:						
Dickman, loamy substratum, moderately eroded	---	---	---	Low	Moderate	Moderate
Marshall, moderately eroded	---	---	---	High	Moderate	Low
300:						
Bremer, terrace	---	---	---	High	High	Low
337D2:						
Dickman, loamy substratum, moderately eroded	---	---	---	Low	Low	Moderate
Sharpsburg, moderately eroded	---	---	---	High	High	Moderate
370:						
Sharpsburg	---	---	---	High	High	Moderate

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
370B:						
Sharpsburg	---	---	---	High	High	Moderate
371C2:						
Sharpsburg, moderately eroded	---	---	---	High	High	Moderate
Nira, moderately eroded	---	---	---	High	High	Low
371D2:						
Sharpsburg	---	---	---	High	High	Moderate
Sharpsburg, moderately eroded	---	---	---	High	High	Moderate
Nira, moderately eroded	---	---	---	High	High	Low
371E2:						
Sharpsburg, moderately eroded	---	---	---	High	High	Moderate
Nira, moderately eroded	---	---	---	High	High	Low
430:						
Ackmore, occasionally flooded	---	---	---	High	High	Low
431B:						
Judson	---	---	---	High	Moderate	Moderate
Ackmore, rarely flooded	---	---	---	High	High	Low
Colo, frequently flooded, overwash	---	---	---	High	High	Low
435:						
Zook, occasionally flooded	---	---	---	High	High	Low
Mt. Sterling, occasionally flooded	---	---	---	High	High	Low
469C2:						
Lamoni, moderately eroded	Abrupt textural change	6	---	Moderate	High	Low
Clarinda, moderately eroded	Abrupt textural change	6	---	High	High	Low
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
469C3:						
Lamoni, severely eroded	Abrupt textural change	8	---	Moderate	High	Low
Clarinda, severely eroded	Abrupt textural change	4	---	High	High	Low
Shelby, severely eroded	---	---	---	Moderate	Moderate	Low
470D2:						
Lamoni, moderately eroded	Abrupt textural change	6	---	Moderate	High	Low
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
509B:						
Marshall, terrace	---	---	---	High	Moderate	Moderate

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
509C:						
Marshall, terrace	---	---	---	High	Moderate	Moderate
509C2:						
Marshall, terrace, moderately eroded	---	---	---	High	Moderate	Low
545B:						
Zook	---	---	---	High	High	Low
Ely	---	---	---	High	High	Low
Gullied land.						
733:						
Calco, occasionally flooded	---	---	---	High	Moderate	Low
803:						
Melia, terrace	---	---	---	High	Moderate	Low
824E3:						
Shelby, severely eroded	---	---	---	Moderate	Moderate	Low
Lamoni, severely eroded	Abrupt textural change	8	---	Moderate	High	Low
870B:						
Sharpsburg, terrace	---	---	---	High	High	Moderate
1239:						
Corley, terrace	---	---	---	High	Moderate	Moderate
Minden, terrace	---	---	---	High	High	Low
2428:						
Ely	---	---	---	High	High	Low
Colo, overwash	---	---	---	High	High	Low
Mt. Sterling	---	---	---	High	High	Low
4946C. Udorthents-Interstate highway						
5030. Pits, limestone quarry						
5040. Udorthents, loamy						
5080. Udorthents, sanitary landfill						
AW. Animal waste lagoon						
SL. Sewage lagoon						
W. Water						

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
Y8B:						
Judson	---	---	---	High	Moderate	Moderate
Y8C:						
Judson	---	---	---	High	Moderate	Moderate
Y24C2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Y24D2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Y24D3:						
Shelby, severely eroded	---	---	---	Moderate	Moderate	Low
Y24E:						
Shelby	---	---	---	Moderate	Moderate	Moderate
Y24E2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Y24E3:						
Shelby, severely eroded	---	---	---	Moderate	Moderate	Low
Y24F2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Y24F3:						
Shelby, severely eroded	---	---	---	Moderate	Moderate	Low
Y82C3:						
Adair, severely eroded	Abrupt textural change	3	---	High	High	Moderate
Shelby, severely eroded	---	---	---	Moderate	Moderate	Low
Y93D2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Adair, moderately eroded	Abrupt textural change	8	---	High	High	Moderate
Y93D3:						
Shelby, severely eroded	---	---	---	Moderate	Moderate	Low
Adair, severely eroded	Abrupt textural change	3	---	High	High	Moderate
Y93E2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Adair, moderately eroded	Abrupt textural change	8	---	High	High	Moderate
Y192C2:						
Adair, moderately eroded	Abrupt textural change	8	---	High	High	Moderate
Y192D2:						
Adair, moderately eroded	Abrupt textural change	8	---	High	High	Moderate

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
Y222C2:						
Clarinda, moderately eroded	Abrupt textural change	6	---	High	High	Low
Y222D2:						
Clarinda, moderately eroded	Abrupt textural change	6	---	High	High	Low
Y222D3:						
Clarinda, severely eroded	Abrupt textural change	4	---	High	High	Low
Z8B:						
Judson	---	---	---	High	Moderate	Moderate
Z8C:						
Judson	---	---	---	High	Moderate	Moderate
Z24D2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Z24D3:						
Shelby, severely eroded	---	---	---	Moderate	Moderate	Low
Z24E2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Z24E3:						
Shelby, severely eroded	---	---	---	Moderate	Moderate	Low
Z24F2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Z82D3:						
Adair, severely eroded	Abrupt textural change	3	---	High	High	Moderate
Shelby, severely eroded	---	---	---	Moderate	Moderate	Low
Z93C2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Adair, moderately eroded	Abrupt textural change	8	---	High	High	Moderate
Z93D2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Adair, moderately eroded	Abrupt textural change	8	---	High	High	Moderate
Z93E2:						
Shelby, moderately eroded	---	---	---	Moderate	Moderate	Low
Adair, moderately eroded	Abrupt textural change	8	---	High	High	Moderate
Z192C3:						
Adair, severely eroded	Abrupt textural change	3	---	High	High	Moderate

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
Z222D2:						
Clarinda, moderately eroded-----------	Abrupt textural change	6	---	High	High	Low

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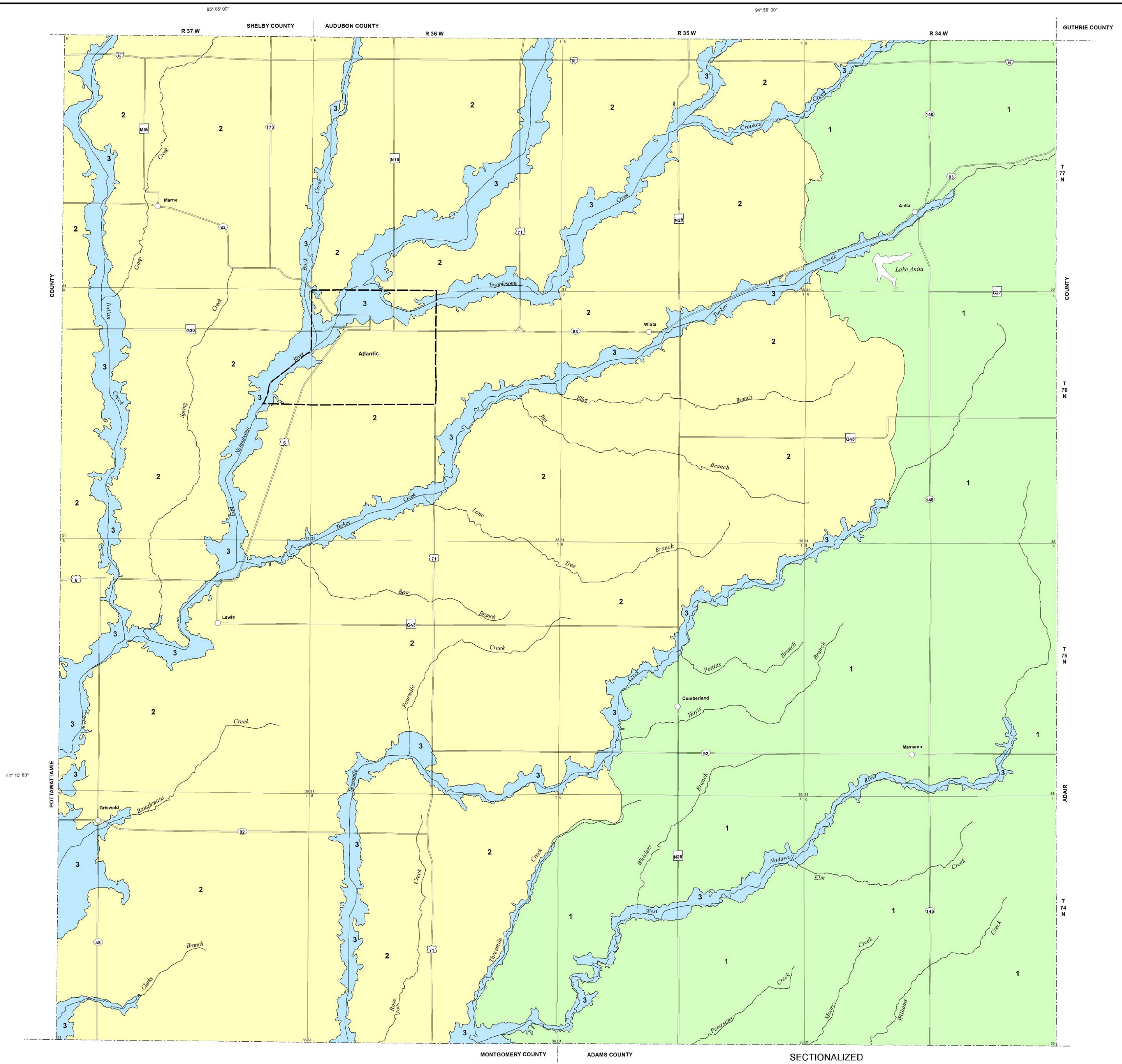

95° 05' 00"
94° 50' 00"
41° 15' 00"
SHELBY COUNTY
AUDUBON COUNTY
GUTHRIE COUNTY
POTTAWATTAMIE COUNTY
ADAIR COUNTY
MONTGOMERY COUNTY
ADAMS COUNTY
R 37 W
R 36 W
R 35 W
R 34 W
T 77 N
T 76 N
T 75 N
T 74 N
Marne
Atlantic
Anita
Lake Anita
Wiota
Lewis
Cumberland
Massena
Griswold
Indian Creek
Camp Creek
Spring Creek
Buck Creek
Nishnabotna River
Troublesome Creek
Crooked Creek
Turkey Creek
Eller Branch
Jim Branch
Lone Tree Branch
Bear Branch
Fourmile Creek
Sevenmile Creek
Baughmans Creek
Clarks Branch
Rose Creek
Threemile Creek
Pettitts Branch
Hayts Branch
Whistlers Branch
West Nodaway River
Nodaway River
Elm Creek
Petersons Creek
Moore Creek
Williams Creek
M56
173
N16
N28
G30
G27
G43
G45
83
71
6
92
148
48

LEGEND

🟩 1	Sharpsburg-Shelby association
🟨 2	Marshall-Exira-Judson association
🟦 3	Nodaway-Zook association

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION
COOPERATIVE EXTENSION SERVICE, IOWA STATE UNIVERSITY
DIVISION OF SOIL CONSERVATION,
IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP

GENERAL SOIL MAP
CASS COUNTY, IOWA

1 0 1 2 3 4
Miles

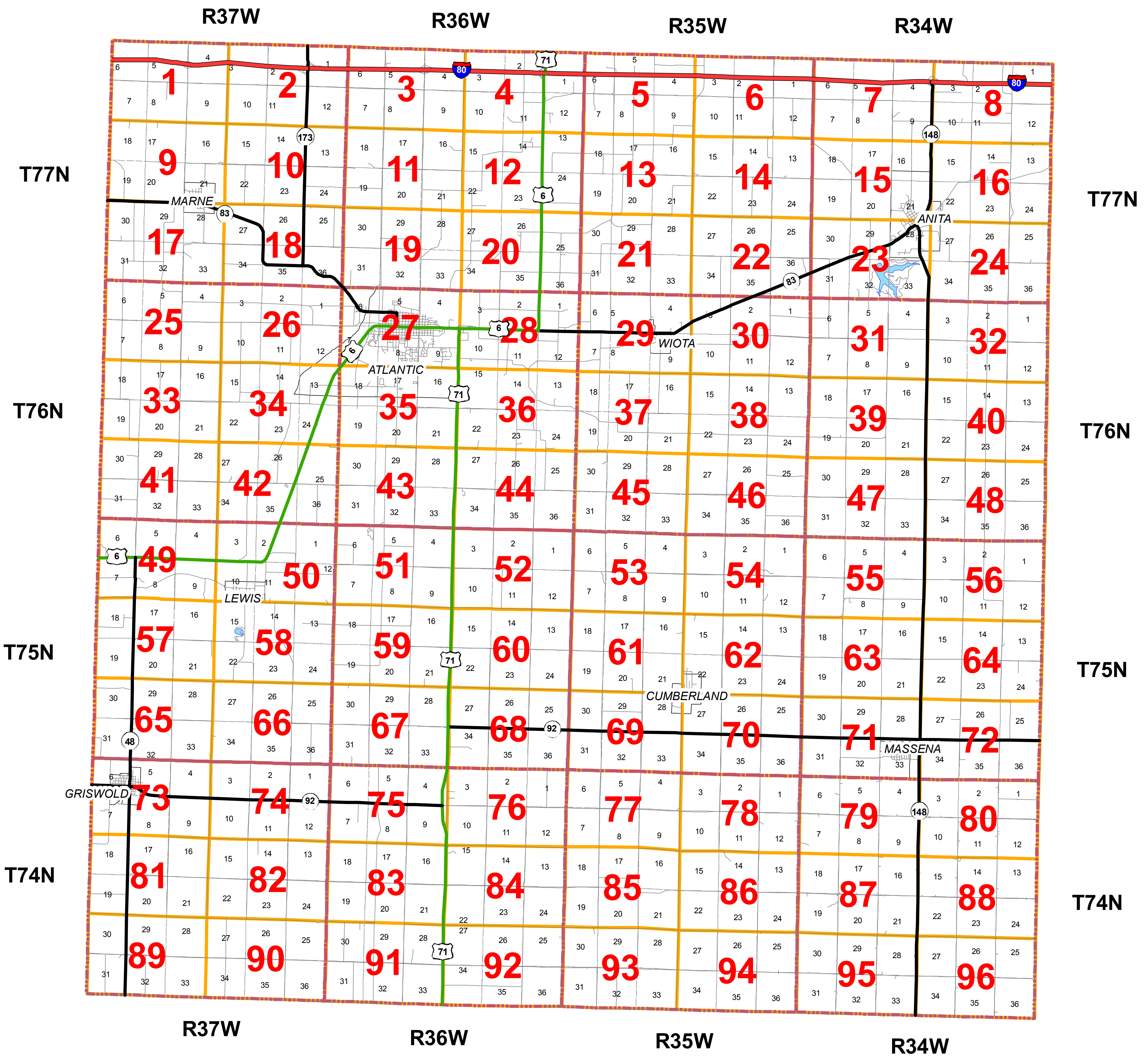
1 0 1 2 3 4
Kilometers

SCALE = 1:167,000

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.


R37W
R36W
R35W
R34W
T77N
T76N
T75N
T74N
MARNE
ANITA
ATLANTIC
WIOTA
LEWIS
CUMBERLAND
MASSENA
GRISWOLD
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96

Index To
Map Sheets
Cass County
Iowa

CASS COUNTY, IOWA

SOIL LEGEND

Map unit symbols consist of a combination of numbers and letters. An initial letter of Y indicates that the map unit is in MLRA 108D; a Z indicates that the map unit is in MLRA 107B. The initial numbers represent the kind of soil. A capital letter following those numbers indicates the class of slope. Map unit symbols that do not have a slope class letter are for nearly level soils or for miscellaneous areas. A final number of 2 following the slope class letter indicates that the map unit is predominantly moderately eroded. A final number of 3 indicates that the map unit is predominantly severely eroded. A plus sign (+) indicates an overwash phase.

7	Wiota silty clay loam, 0 to 2 percent slopes, rarely flooded
7B	Wiota silty clay loam, 2 to 5 percent slopes, rarely flooded
9	Marshall silty clay loam, 0 to 2 percent slopes
9B	Marshall silty clay loam, 2 to 5 percent slopes
9C2	Marshall silty clay loam, 5 to 9 percent slopes, moderately eroded
9C3	Marshall silty clay loam, 5 to 9 percent slopes, severely eroded
9D2	Marshall silty clay loam, 9 to 14 percent slopes, moderately eroded
15B	Olmitz-Ely-Zook complex, 2 to 5 percent slopes
16	Nodaway-Kennebec complex, 0 to 2 percent slopes, occasionally flooded
43	Bremer silty clay loam, 0 to 2 percent slopes, rarely flooded
54	Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded
54+	Zook silt loam, 0 to 2 percent slopes, occasionally flooded, overwash
88	Nevin silty clay loam, 0 to 2 percent slopes, rarely flooded
99D2	Exira silty clay loam, 9 to 14 percent slopes, moderately eroded
99D3	Exira silty clay loam, 9 to 14 percent slopes, severely eroded
99E2	Exira silty clay loam, 14 to 18 percent slopes, moderately eroded
99E3	Exira silty clay loam, 14 to 18 percent slopes, severely eroded
113B	Colo, overwash-Ely complex, 2 to 5 percent slopes
136	Ankeny fine sandy loam, 0 to 2 percent slopes, occasionally flooded
212	Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded
22	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded
229C2	Clarinda, moderately eroded-Clarinda, severely eroded, complex, 5 to 9 percent slopes
229D2	Clarinda, moderately eroded-Clarinda, severely eroded, complex, 9 to 14 percent slopes
247D2	Shelby, sandy substratum-Hesch, deep-Hesch complex, 9 to 14 percent slopes, moderately eroded
269	Humeston silty clay loam, 0 to 2 percent slopes, occasionally flooded
273B	Olmitz loam, 2 to 5 percent slopes
289D2	Dickman, loamy substratum-Marshall complex, 9 to 14 percent slopes, moderately eroded
300	Bremer silty clay loam, 0 to 2 percent slopes
337D2	Dickman, loamy substratum-Sharpsburg complex, 9 to 14 percent slopes, moderately eroded
370	Sharpsburg silty clay loam, 0 to 2 percent slopes
370B	Sharpsburg silty clay loam, 2 to 5 percent slopes
371C2	Sharpsburg-Nira complex, 5 to 9 percent slopes, moderately eroded
371D2	Sharpsburg-Nira complex, 9 to 14 percent slopes, moderately eroded
371E2	Sharpsburg-Nira complex, 14 to 18 percent slopes, moderately eroded
430	Ackmore silt loam, 0 to 2 percent slopes, occasionally flooded
431B	Judson-Ackmore-Colo, overwash, complex, 1 to 5 percent slopes
435	Zook-Mt. Sterling complex, 0 to 2 percent slopes, occasionally flooded
469C2	Lamoni-Clarinda-Shelby complex, 5 to 9 percent slopes, moderately eroded
469C3	Lamoni-Clarinda-Shelby complex, 5 to 9 percent slopes, severely eroded
470D2	Lamoni-Shelby complex, 9 to 14 percent slopes, moderately eroded
509B	Marshall silty clay loam, terrace, 2 to 5 percent slopes
509C	Marshall silty clay loam, terrace, 5 to 9 percent slopes
509C2	Marshall silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded
545B	Zook-Ely-Gullied land complex, 2 to 5 percent slopes
733	Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded
803	Melia silty clay loam, terrace, 0 to 2 percent slopes
824E3	Shelby-Lamoni complex, 14 to 18 percent slopes, severely eroded
870B	Sharpsburg silty clay loam, terrace, 1 to 5 percent slopes
1239	Corley-Minden complex, terrace, 0 to 2 percent slopes
2428	Ely-Colo, overwash-Mt. Sterling complex, 0 to 2 percent slopes
4946C	Udorthents-Highway complex, 0 to 9 percent slopes
5030	Pits, limestone quarries
5040	Udorthents, loamy
5080	Udorthents, sanitary landfill
AW	Animal waste lagoon
SL	Sewage lagoon
W	Water
Y8B	Judson silty clay loam, MLRA 108D, 2 to 5 percent slopes
Y8C	Judson silty clay loam, MLRA 108D, 5 to 9 percent slopes
Y24C2	Shelby clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded
Y24D2	Shelby clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded
Y24D3	Shelby clay loam, MLRA 108D, 9 to 14 percent slopes, severely eroded
Y24E	Shelby clay loam, MLRA 108D, 14 to 18 percent slopes
Y24E2	Shelby clay loam, MLRA 108D, 14 to 18 percent slopes, moderately eroded
Y24E3	Shelby clay loam, MLRA 108D, 14 to 18 percent slopes, severely eroded
Y24F2	Shelby clay loam, MLRA 108D, 18 to 25 percent slopes, moderately eroded
Y24F3	Shelby clay loam, MLRA 108D, 18 to 25 percent slopes, severely eroded
Y82C3	Adair-Shelby complex, MLRA 108D, 5 to 9 percent slopes, severely eroded
Y93D2	Shelby-Adair complex, MLRA 108D, 9 to 14 percent slopes, moderately eroded
Y93D3	Shelby-Adair complex, MLRA 108D, 9 to 14 percent slopes, severely eroded
Y93E2	Shelby-Adair complex, MLRA 108D, 14 to 18 percent slopes, moderately eroded
Y192C2	Adair clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded
Y192D2	Adair clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded
Y222C2	Clarinda silty clay loam, MLRA 108D, 5 to 9 percent slopes, moderately eroded
Y222D2	Clarinda silty clay loam, MLRA 108D, 9 to 14 percent slopes, moderately eroded
Y222D3	Clarinda silty clay loam, MLRA 108D, 9 to 14 percent slopes, severely eroded
Z8B	Judson silty clay loam, MLRA 107B, 2 to 5 percent slopes
Z8C	Judson silty clay loam, MLRA 107B, 5 to 9 percent slopes
Z24D2	Shelby clay loam, MLRA 107B, 9 to 14 percent slopes, moderately eroded
Z24D3	Shelby clay loam, MLRA 107B, 9 to 14 percent slopes, severely eroded
Z24E2	Shelby clay loam, MLRA 107B, 14 to 18 percent slopes, moderately eroded
Z24E3	Shelby clay loam, MLRA 107B, 14 to 18 percent slopes, severely eroded
Z24F2	Shelby clay loam, MLRA 107B, 18 to 25 percent slopes, moderately eroded
Z82D3	Adair-Shelby complex, MLRA 107B, 9 to 14 percent slopes, severely eroded
Z93C2	Shelby-Adair complex, MLRA 107B, 5 to 9 percent slopes, moderately eroded
Z93D2	Shelby-Adair complex, MLRA 107B, 9 to 14 percent slopes, moderately eroded
Z93E2	Shelby-Adair complex, MLRA 107B, 14 to 18 percent slopes, moderately eroded
Z192C3	Adair clay loam, MLRA 107B, 5 to 9 percent slopes, severely eroded
Z222D2	Clarinda silty clay loam, MLRA 107B, 9 to 14 percent slopes, moderately eroded

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

Special Feature - Points

⊠	Calcareous Spot
≐	Severely Eroded Spot
⌗	Glacial Till Spot
∴	Gravelly Spot
⚒	Mine or Quarry
∨	Rock Outcrop
∵	Sandy Spot
⊕	Wet Depression, Restricted Permeability
◉	Perennial Water
ψ	Wet Spot

Special Feature - Lines

∨∧∨∧∨∧	Escarpment, non-bedrock
••••••••••	Short, steep slope

Hydrographic Features

───	Perennial Stream
▨	Crossable W/Usual Farm Equip
– – –	Not Crossable W/Usual Farm Equip
–·–·–	Perennial Drainage Or Irrigation
➤	Drainage End (Indicates Flow Direction)
┼─┼	Railroad
▭	County Boundary
14	Public Land Survey System
☐	Soil Map Units

①

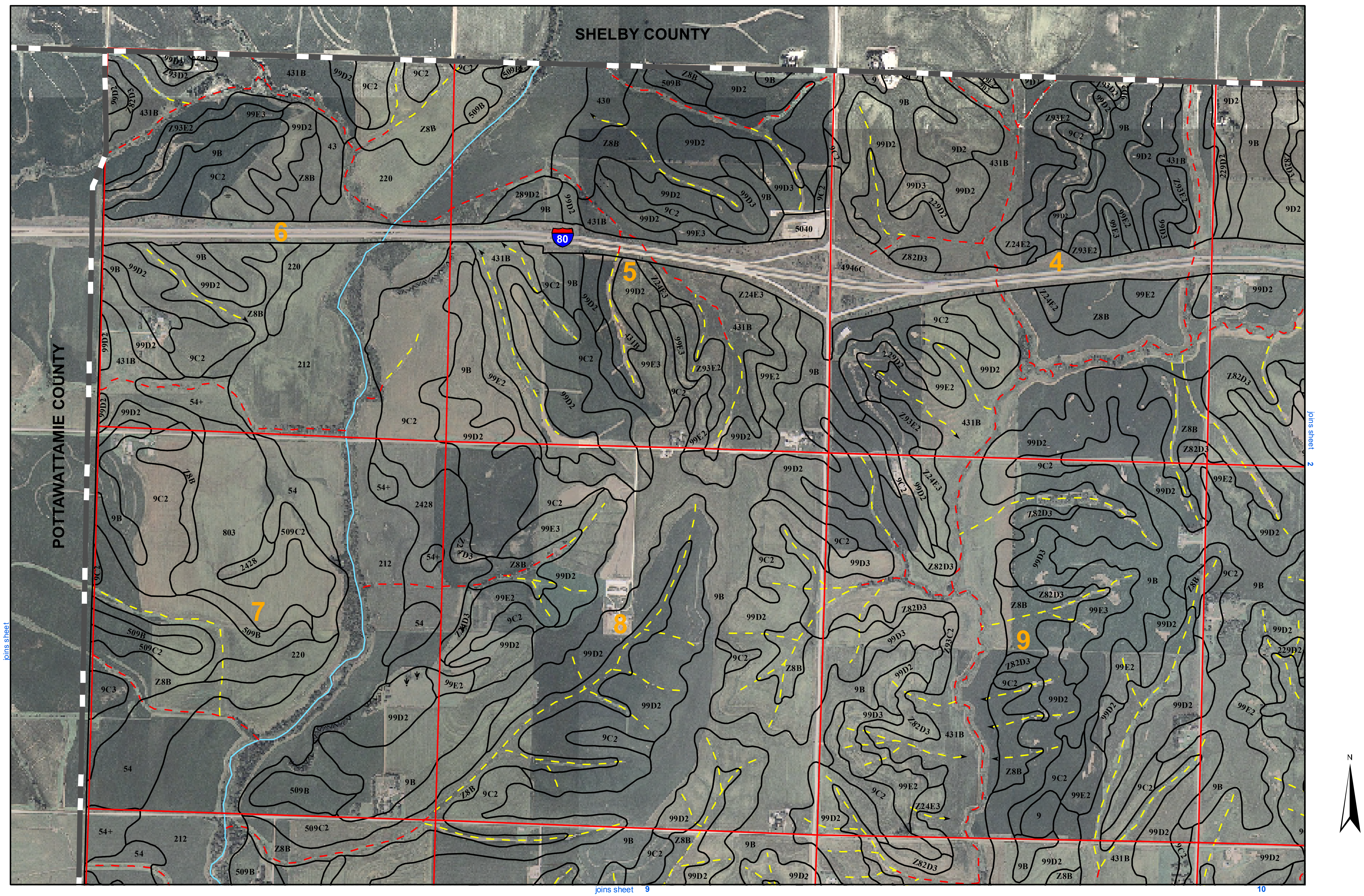
Township 77N Range 37W

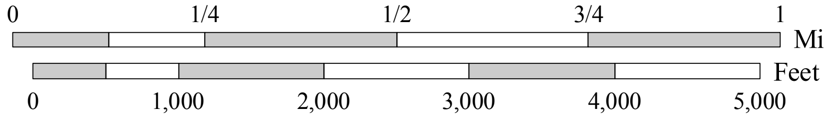
①

Soil Survey of Cass County, Iowa

This map was prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service using a revised version of the February 10, 2011 Cass County, Iowa SSURGO certified database. The soils and hydrography were compiled to spring 2007 imagery of the National Digital Orthophotography Program (NDOP) and being displayed on summer 2007 imagery of the National Agricultural Inventory Project (NAIP).

North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.


SHELBY COUNTY
POTTAWATTAMIE COUNTY
80
4
5
6
7
8
9
joins sheet
joins sheet 2
joins sheet 9
10
N
431B
99E3
99D2
9B
9C2
Z8B
220
212
54+
54
803
2428
509C2
509B
Z93E2
289D2
5040
4946C
Z24E3
Z82D3
99D3
229D2
43
430
9C3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3,000
4,000
5,000
Feet

Visit the online Web Soil Survey at http://websoilsurvey.nrcs.usda.gov
for official and current USDA soil information as viewable maps and tables.
Visit the Soil Data Mart at http://soildatamart.usda.gov to download
SSURGO certified soil tabular and spatial data.

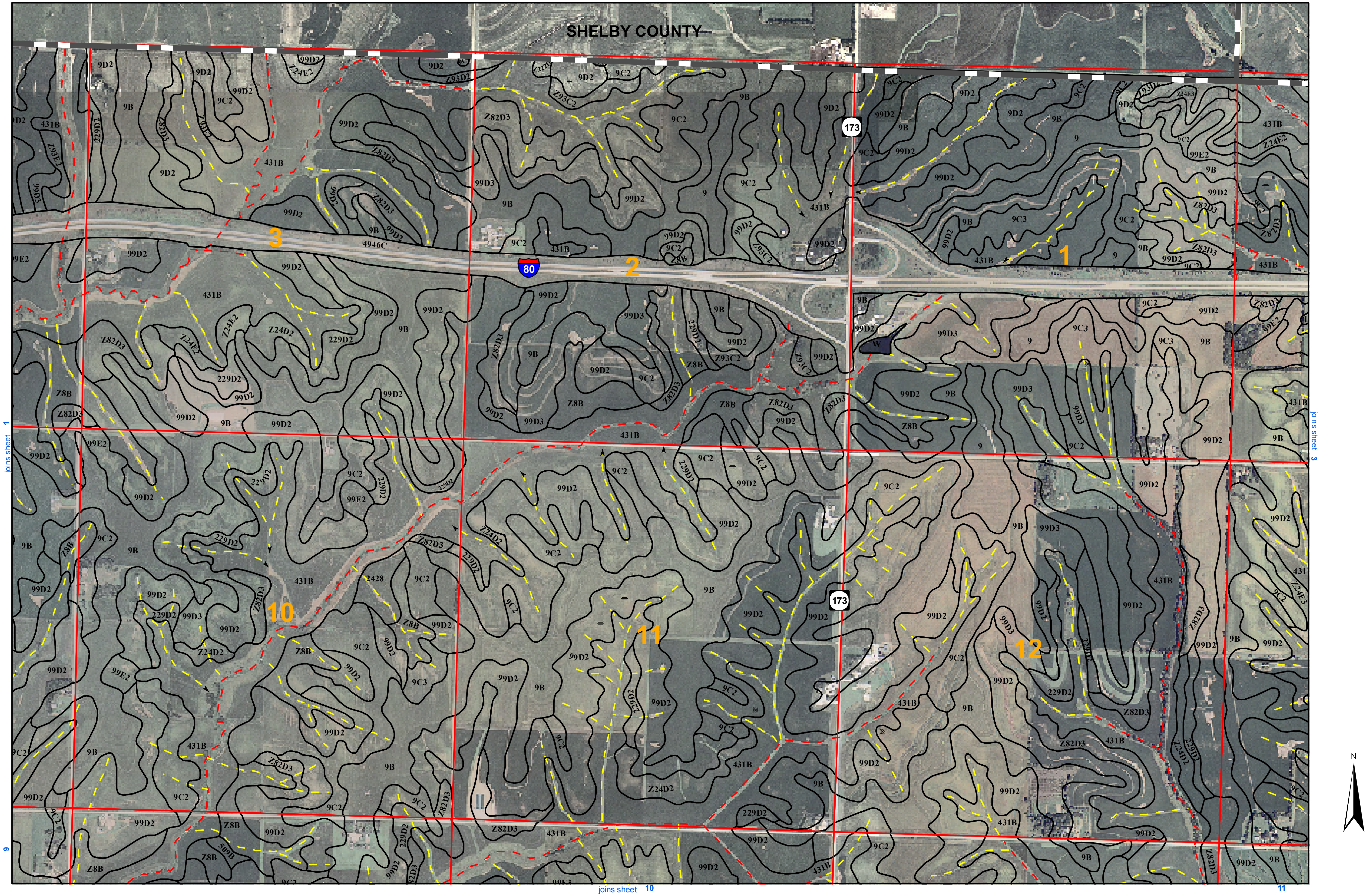
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 77N Range 37W

Soil Survey of Cass County, Iowa

This map was prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service using a revised version of the February 10, 2011 Cass County, Iowa SSURGO certified database. The soils and hydrography were compiled to spring 2007 imagery of the National Digital Orthophotography Program (NDOP) and being displayed on summer 2007 imagery of the National Agricultural Inventory Project (NAIP).

North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.


SHELBY COUNTY
1
2
3
10
11
12
80
173
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joins sheet 3
joins sheet 10
9
11
N
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9B
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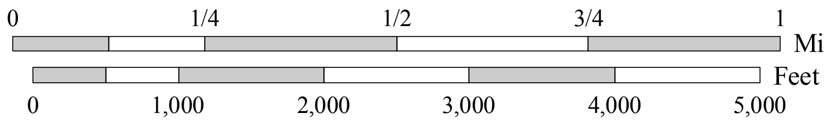
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4,000
5,000

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United States Department of Agriculture
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Township 77N Range 36W

Soil Survey of Cass County, Iowa

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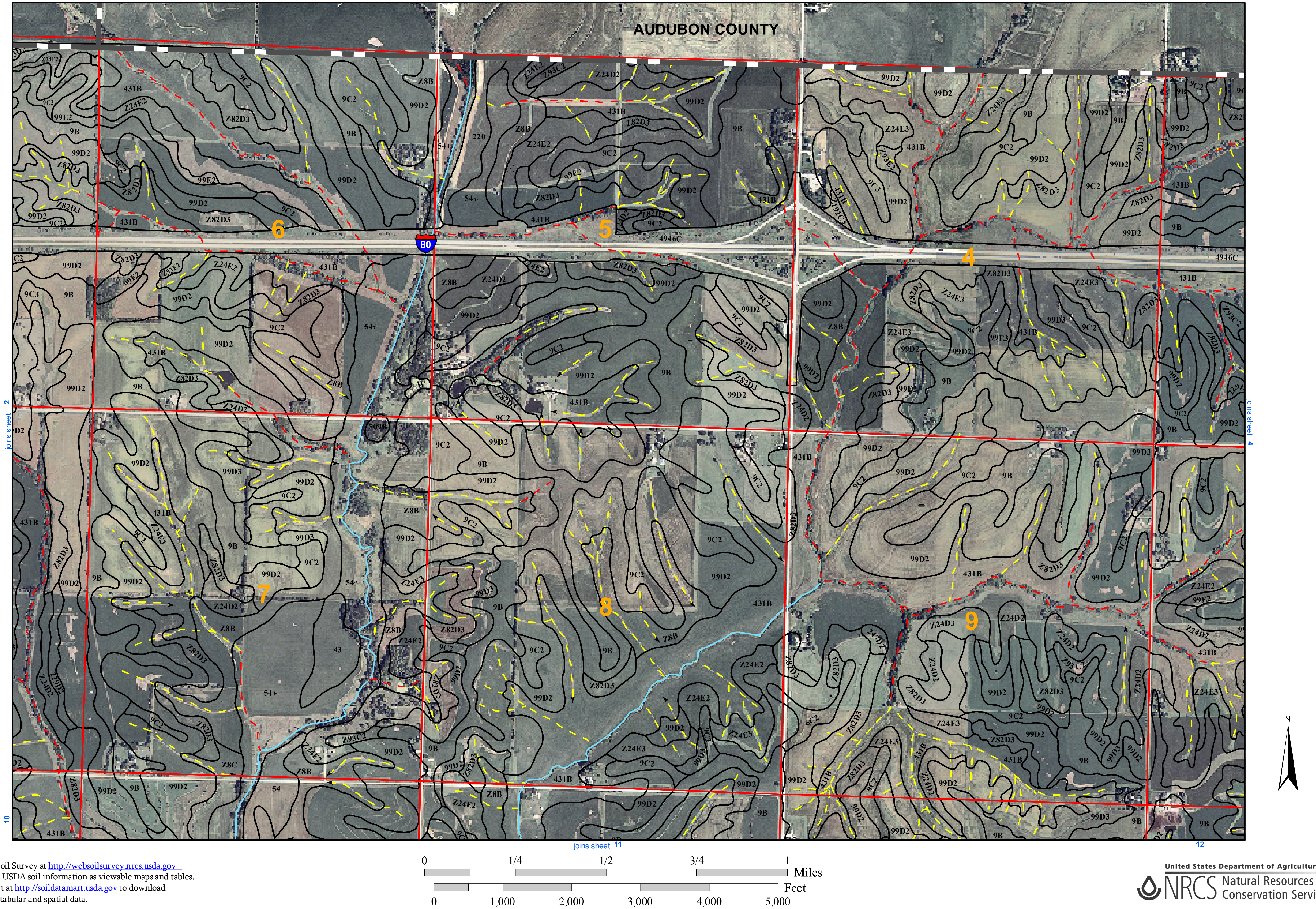
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.


AUDUBON COUNTY
80
6
5
4
7
8
9
joins sheet 2
joins sheet 4
joins sheet 11
10
12
N
0
1/4
1/2
3/4
1
Miles
Feet
0
1,000
2,000
3,000
4,000
5,000
431B
9B
9C2
99D2
99D3
Z82D3
Z24E2
Z24D2
Z24E3
Z93C2
99E2
Z8B
54+
54
220
43
4946C
Z8C

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Township 77N Range 36W

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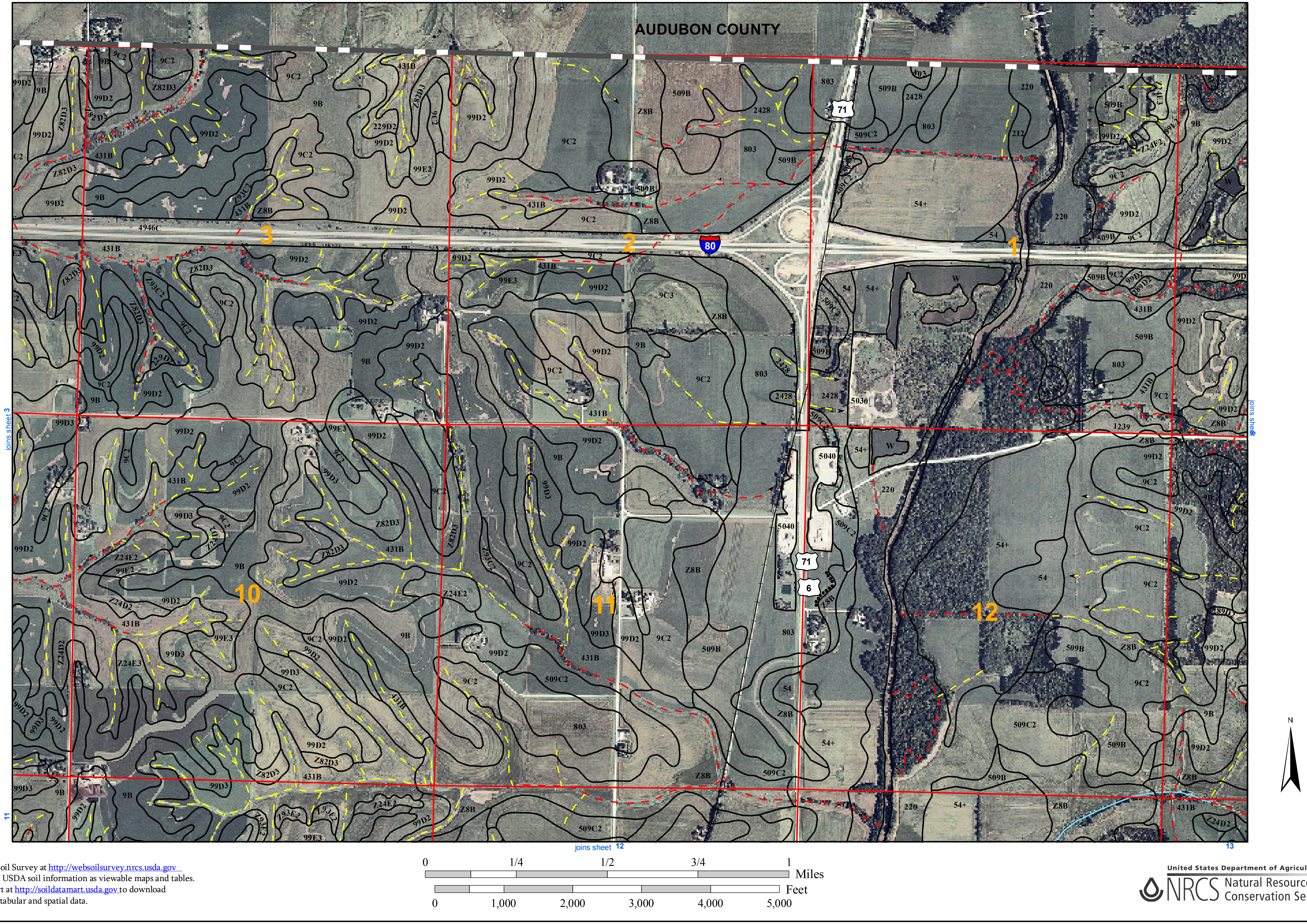
AUDUBON COUNTY
1
2
3
10
11
12
80
71
6
joins sheet 3
joins sheet 12
joins sheet 5
11
13
N
0
1/4
1/2
3/4
1
Miles
0
1,000
2,000
3,000
4,000
5,000
Feet

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Township 77N Range 35W

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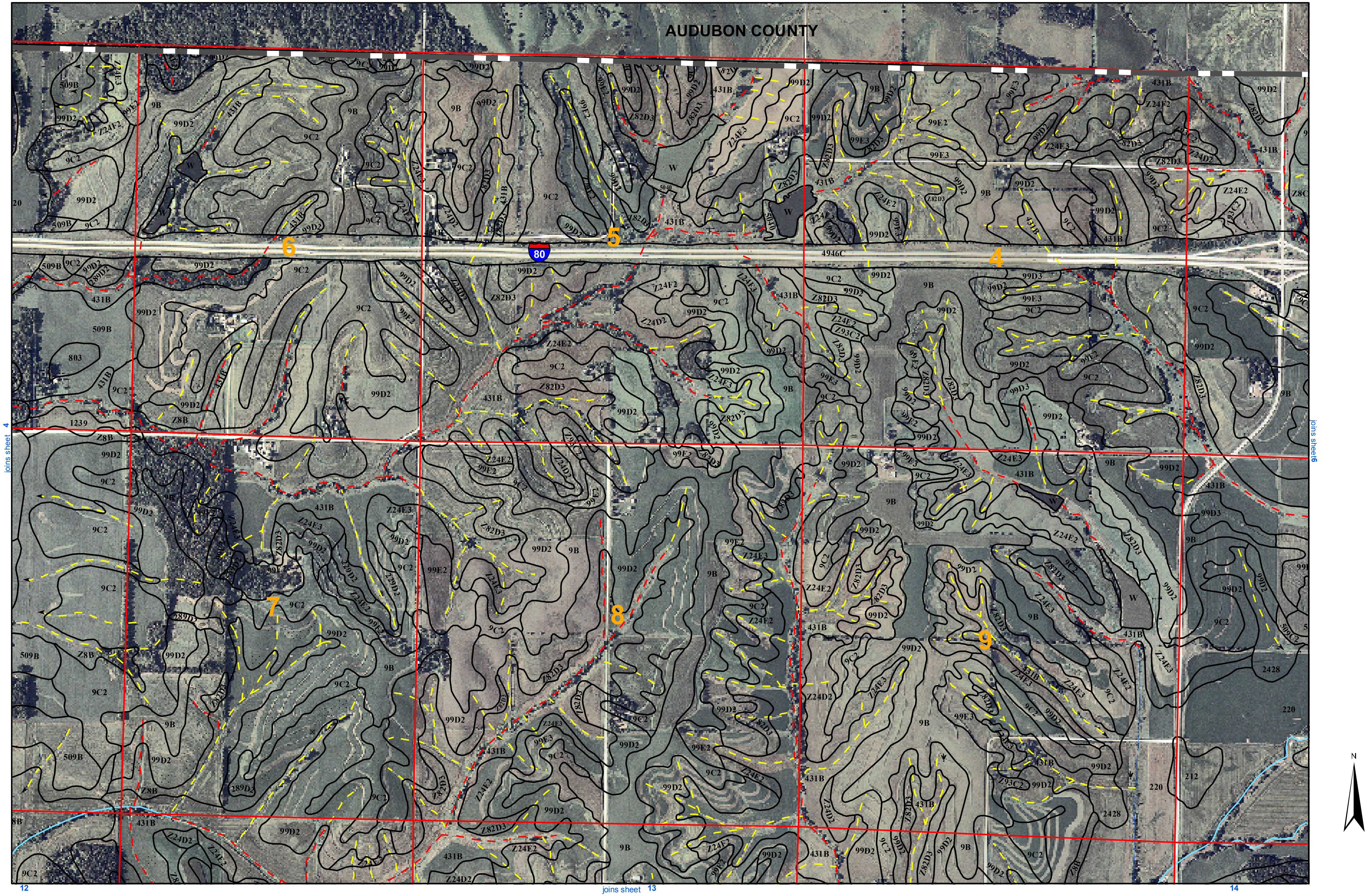
AUDUBON COUNTY
80
6
5
4
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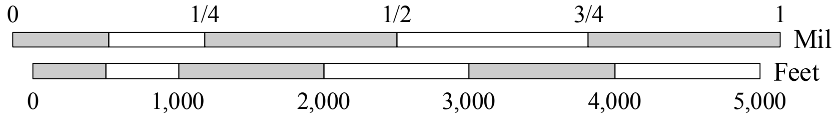
8
9
joins sheet 4
joins sheet 6
joins sheet 13
12
14
N


0
1/4
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Miles
Feet
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1,000
2,000
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4,000
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Township 77N Range 35W

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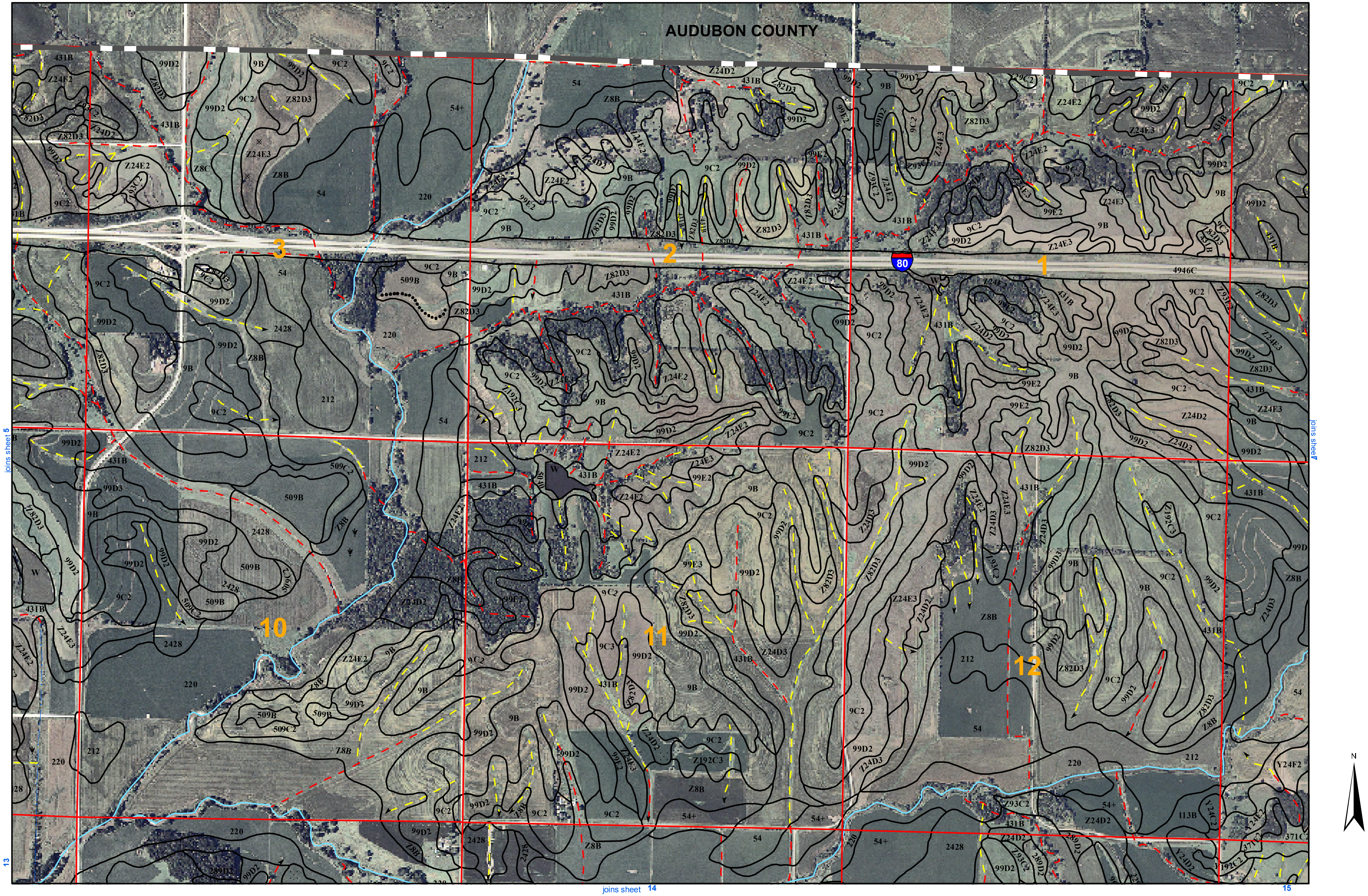
AUDUBON COUNTY
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10
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12
80
4946C
joins sheet 5
joins sheet 7
joins sheet 14
13
15
N
431B
Z24F2
99D2
9B
9C2
Z82D3
54
54+
Z8B
Z24E3
Z24E2
Z24D2
220
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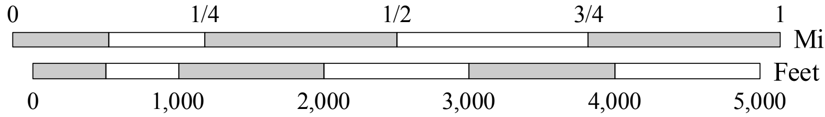
113B
371C2
Y24F2
W


0
1/4
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1
Miles
Feet
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Township 77N Range 34W

Soil Survey of Cass County, Iowa

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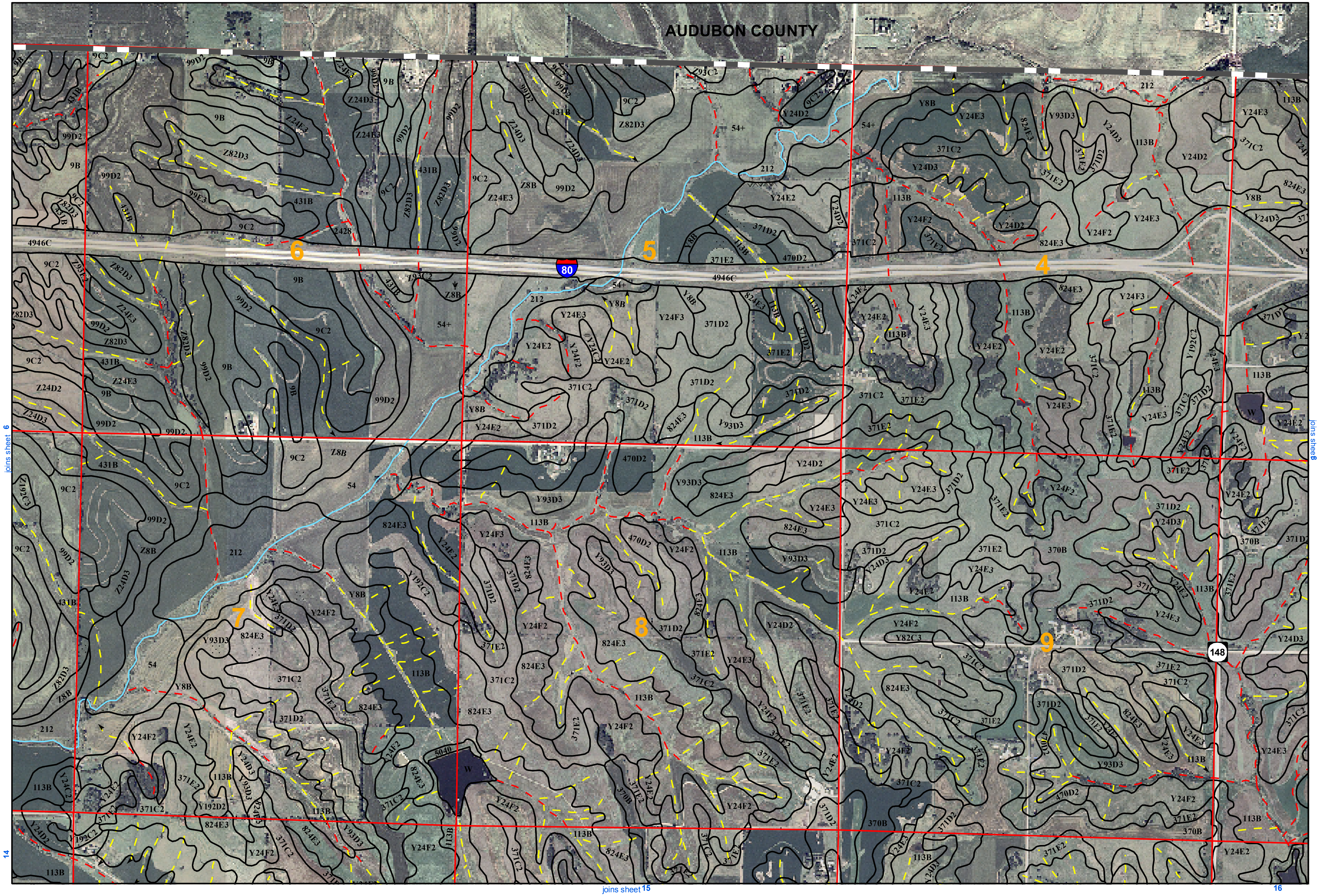
AUDUBON COUNTY
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5
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7
8
9
80
148
joins sheet 6
joins sheet 8
joins sheet 15
14
16
4946C
9C2
9B
99D2
Z82D3
Z24E3
Z24D2
431B
54+
212
54
Z8B
Y8B
Y24E3
Y24E2
Y24F2
Y24F3
Y24D2
Y24D3
Y93D3
371C2
371D2
371E2
113B
824E3
470D2
370B
Y82C3
Y192C2
Y192D2
5040
W
N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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8

Township 77N Range 34W

8

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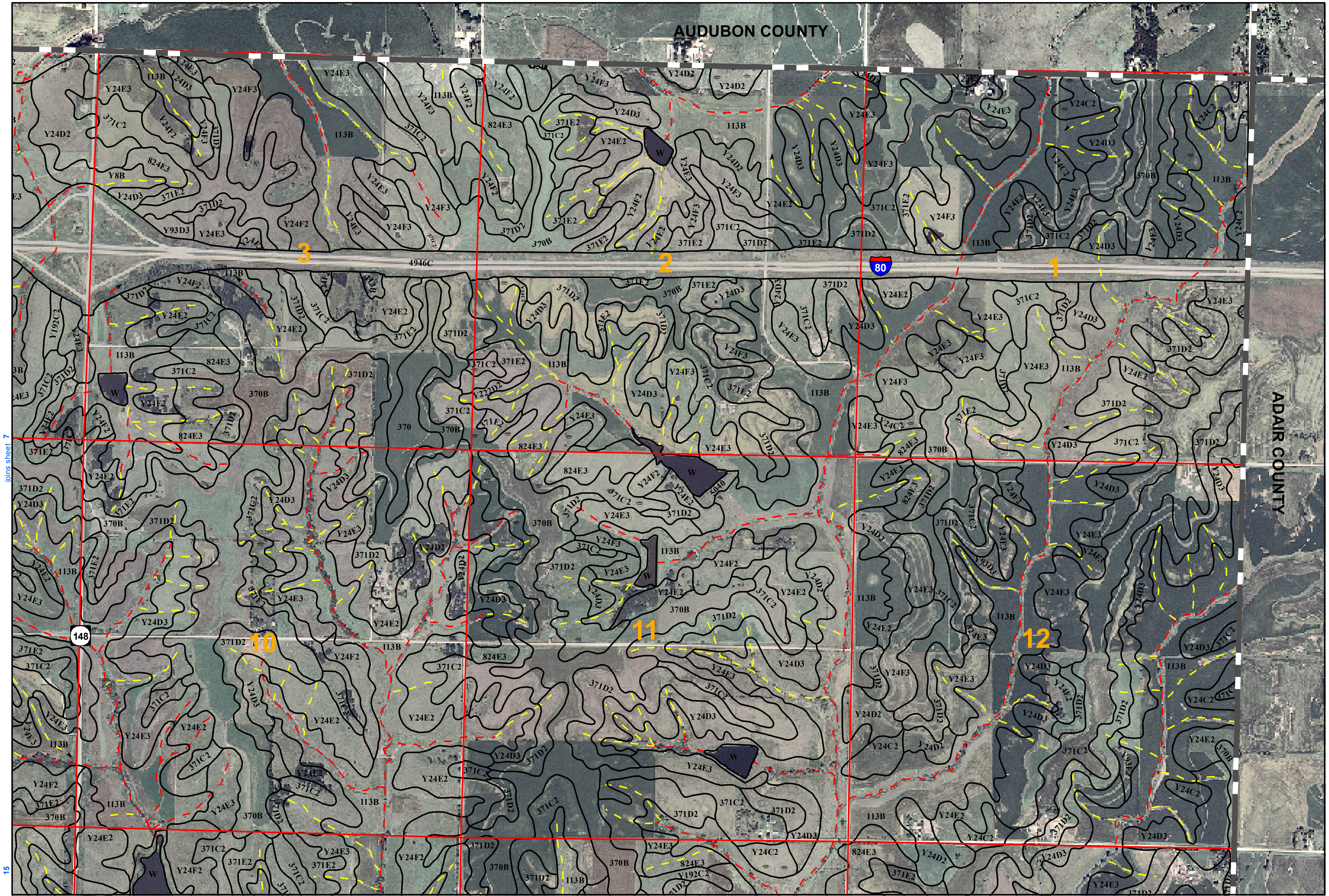
AUDUBON COUNTY
ADAIR COUNTY
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joins sheet 7
15
joins sheet 16
Y24E3
Y24D2
113B
371C2
Y24F3
824E3
370B
371D2
371E2
Y24E2
Y24D3
Y24F2
Y24C2
W
370
N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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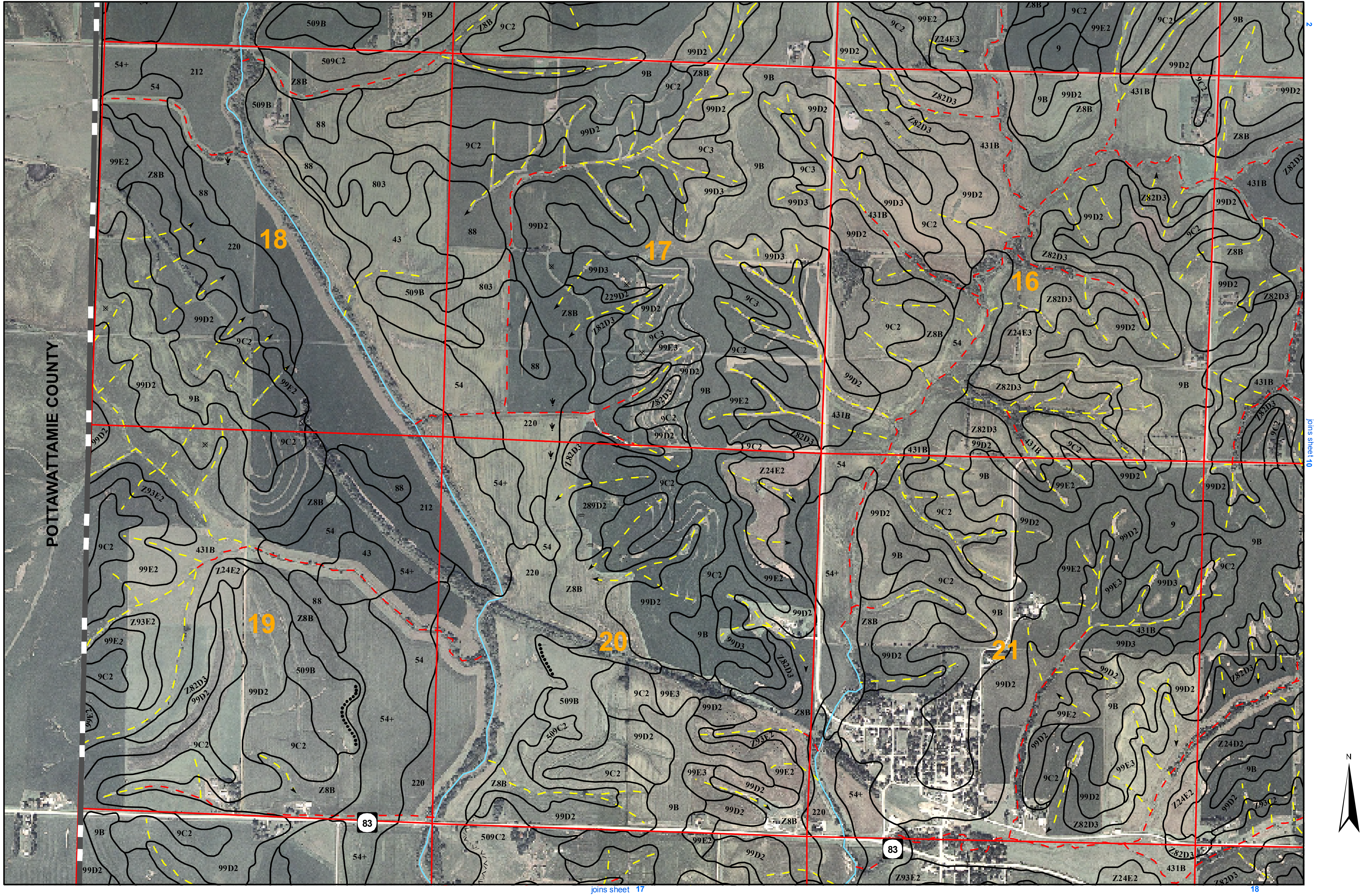
Township 77N Range 37W



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 77N Range 37W

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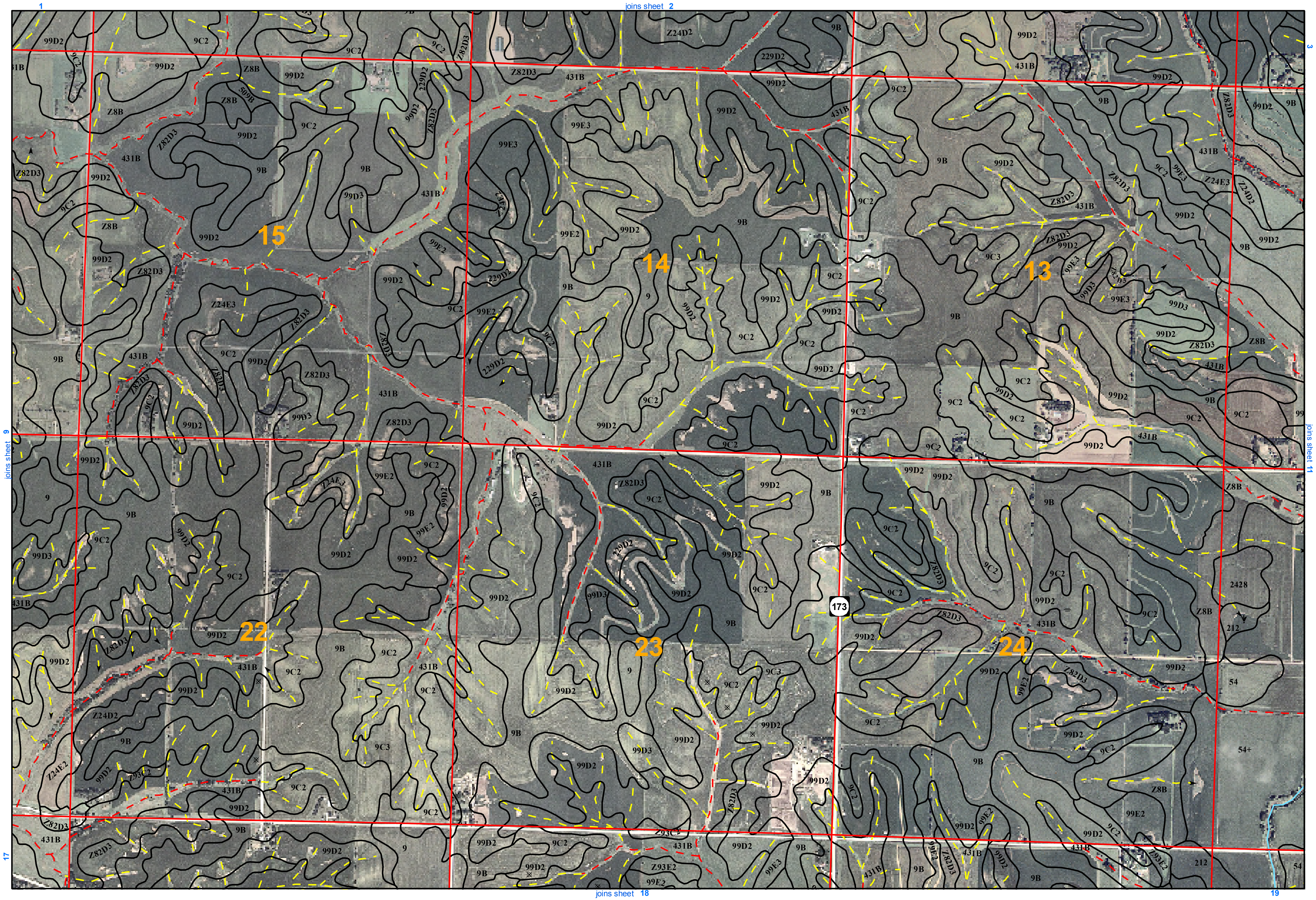
1
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joins sheet 9
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joins sheet 18
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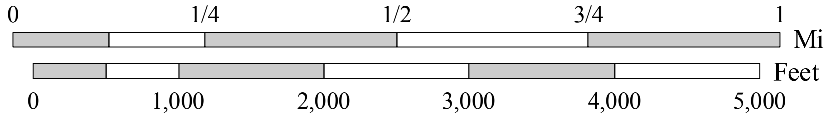
14
13
22
23
24
173
N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United States Department of Agriculture
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11

Township 77N Range 36W

11

Soil Survey of Cass County, Iowa

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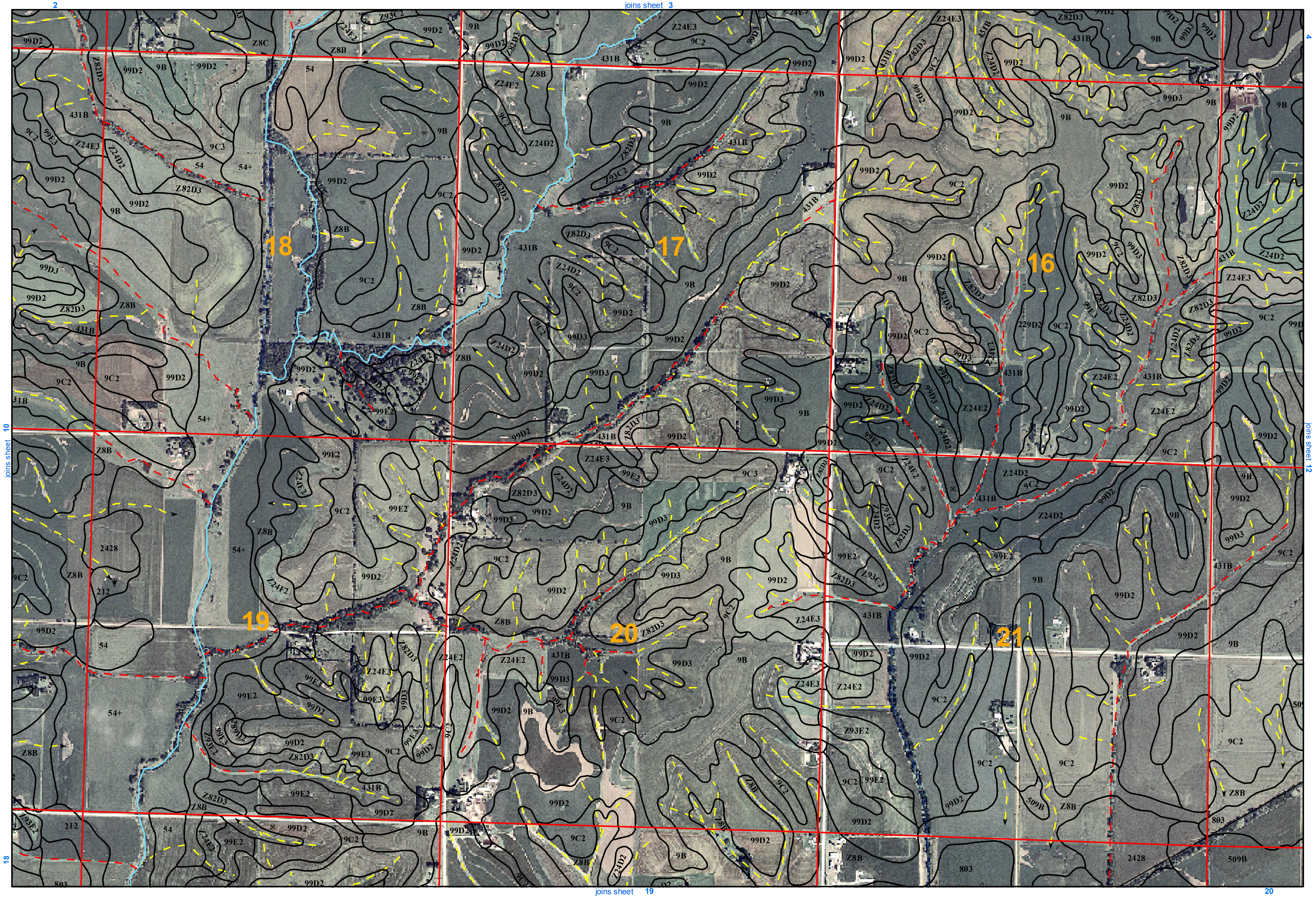

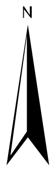

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 77N Range 36W

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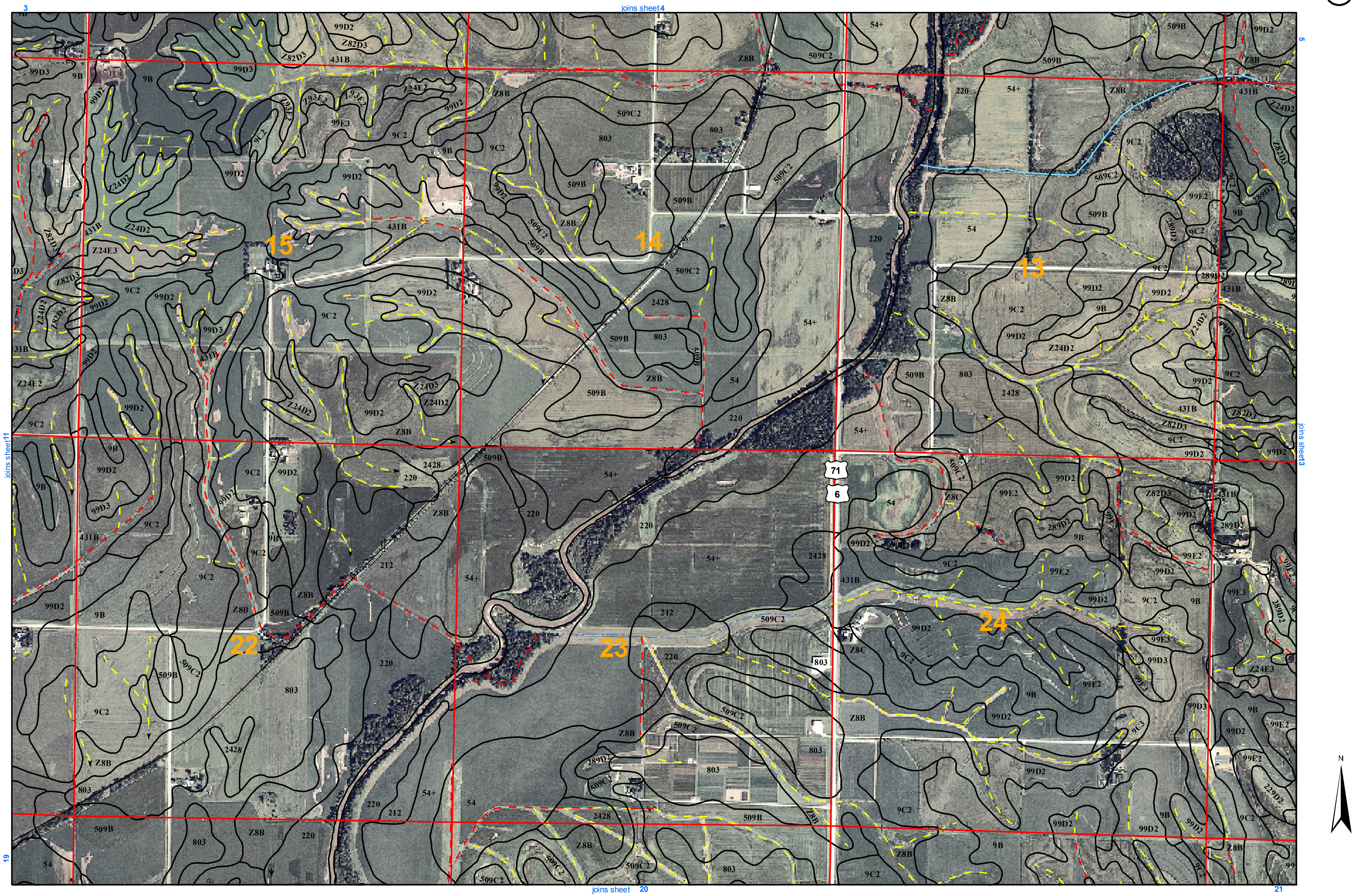
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99D2
Z82D3
431B
99D3
9B
Z24E2
Z93E2
99E3
9C2
99D2
Z24D2
Z82D3
Z24E3
Z8B
509C2
803
509B
54+
220
54
2428
212
289D2
Z24D2
Z82D3
9C2
99E2
99E1
Z24E3
9C3
803
Z8C
509C2
54

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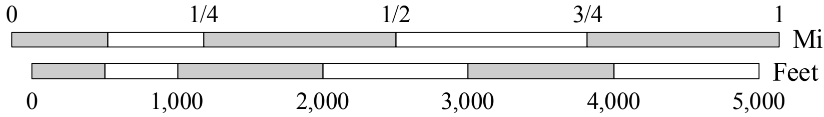
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Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

⑬

Township 77N Range 35W

⑬

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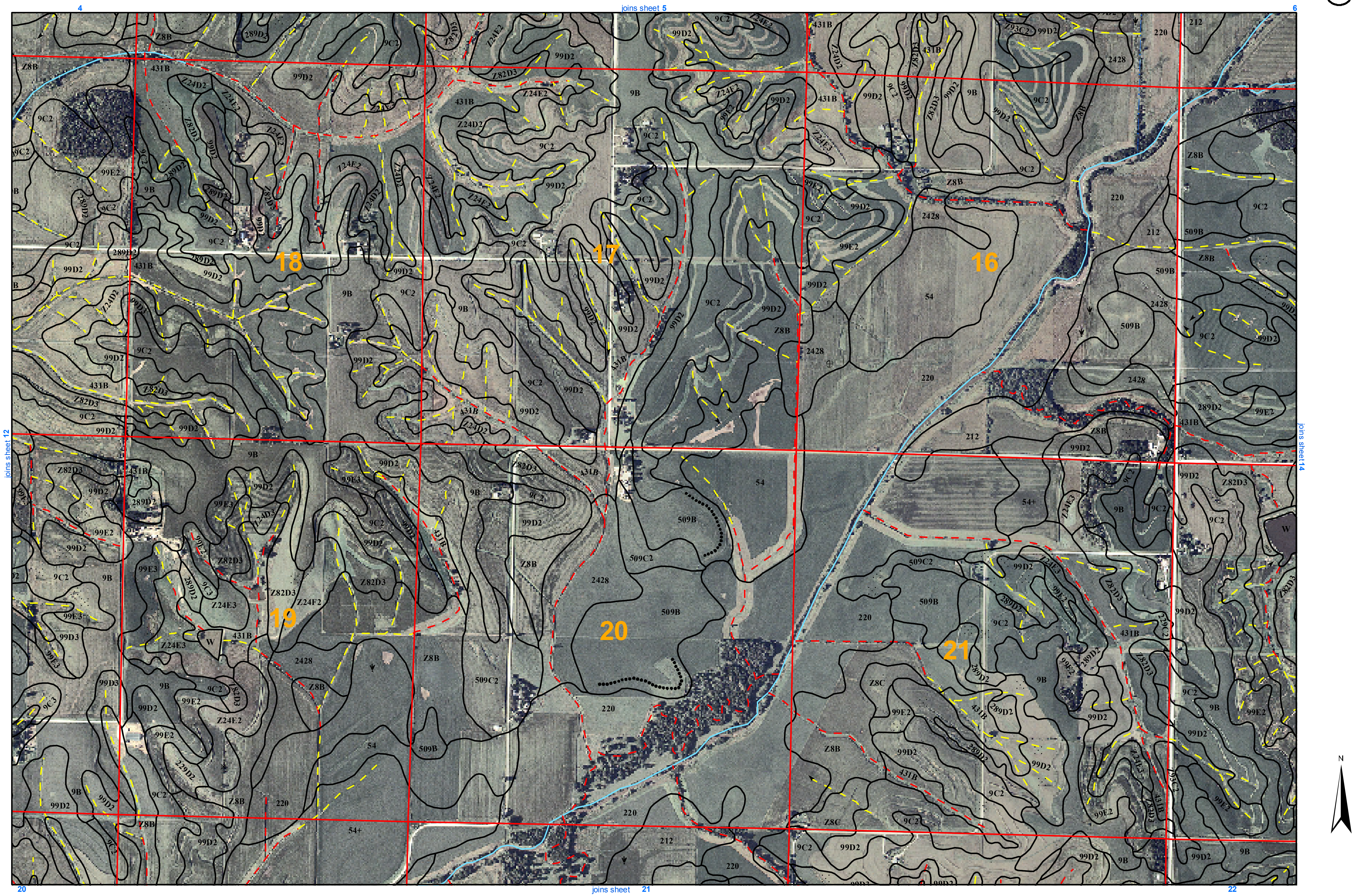

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 77N Range 35W

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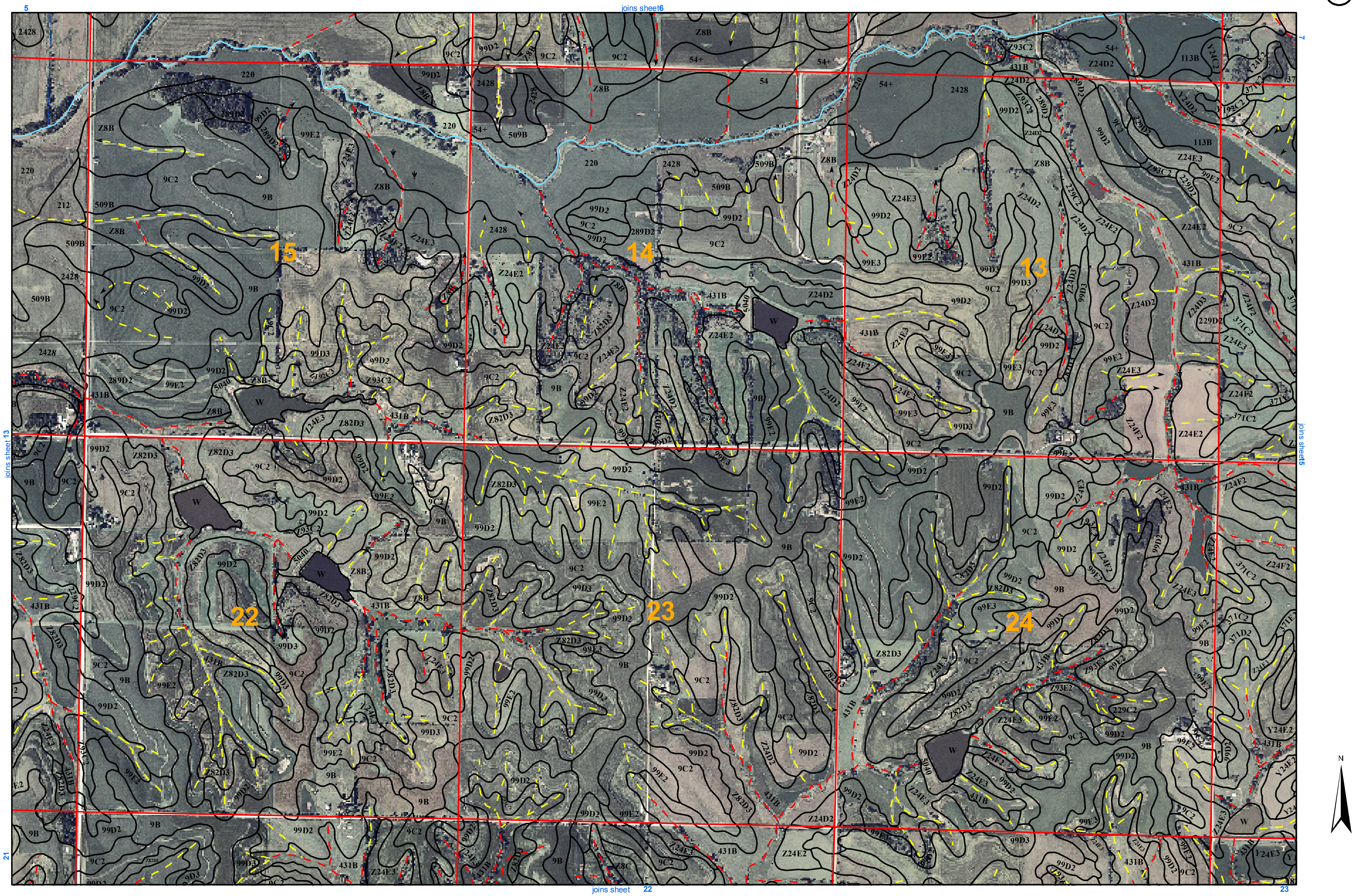
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99D2
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9B
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Z24D2
Z82D3
113B
N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 77N Range 34W

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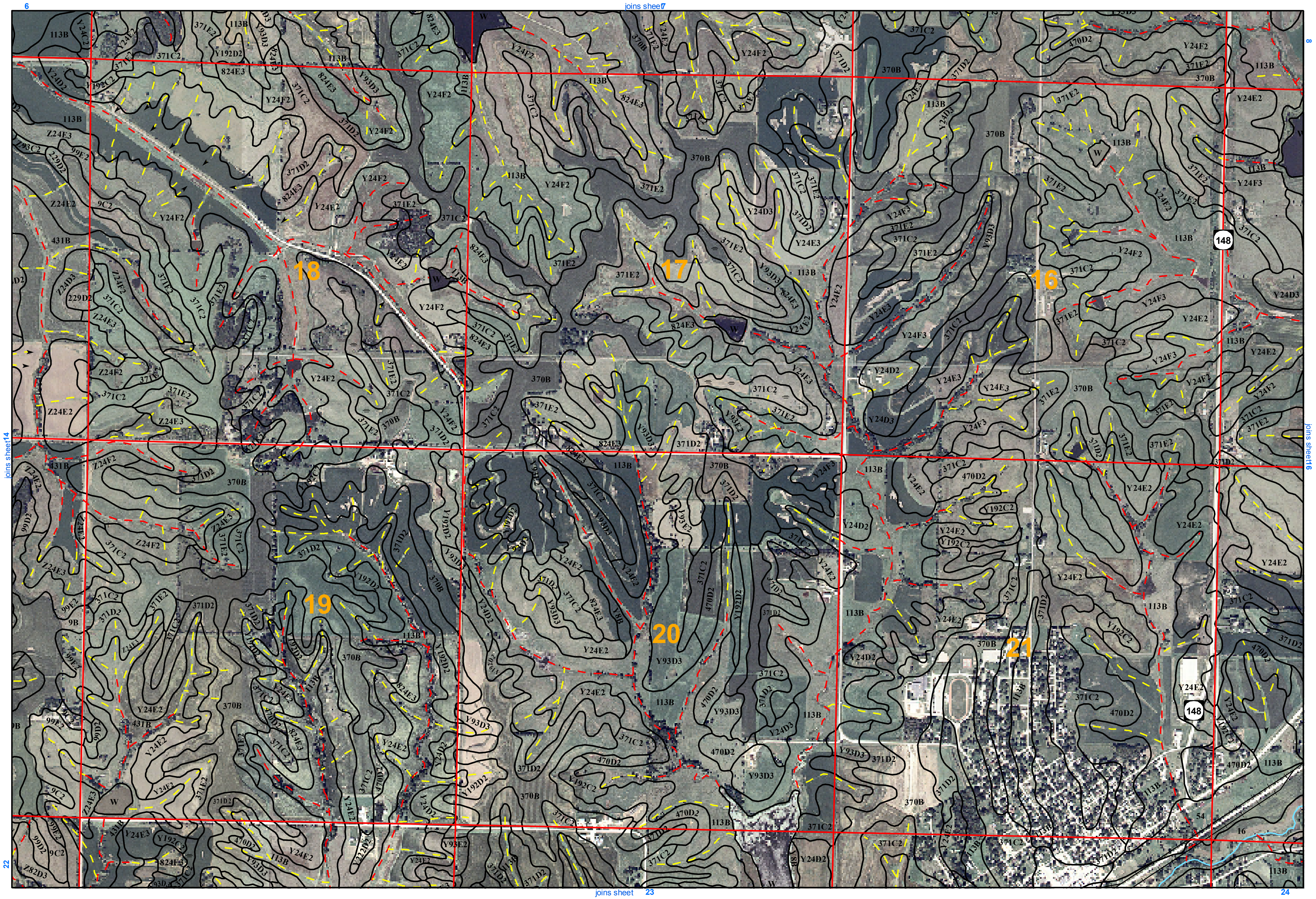

0 1/4 1/2 3/4 1 Miles

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Township 77N Range 34W

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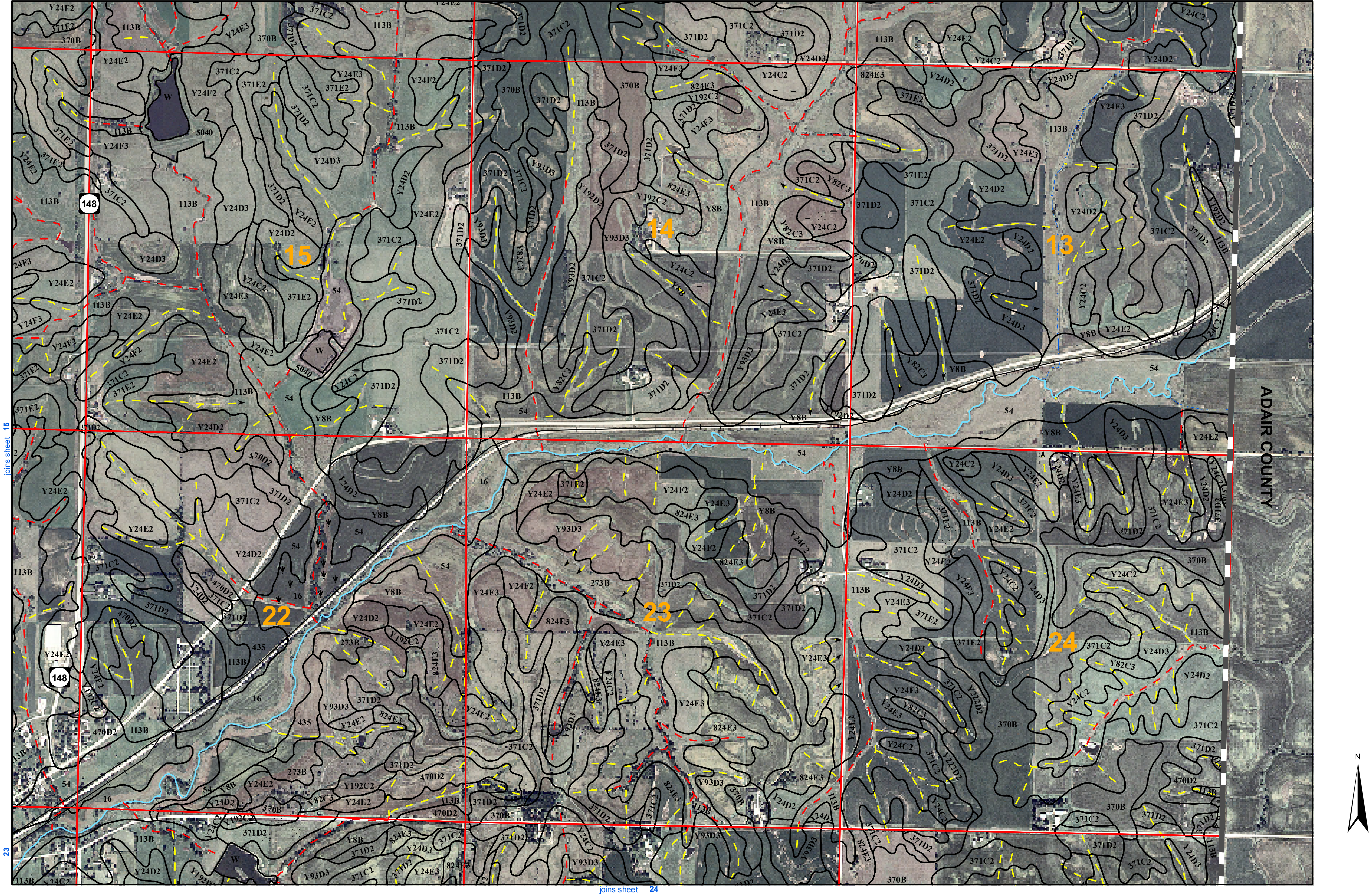
7
joins sheet 8
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joins sheet 24
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ADAIR COUNTY
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148
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113B
370B
371C2
371D2
371E2
Y24C2
Y24D2
Y24D3
Y24E2
Y24E3
Y24F2
Y24F3
Y8B
Y82C3
Y93D3
Y192C2
54
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273B
435
470D2
824E3
5040

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 77N Range 37W

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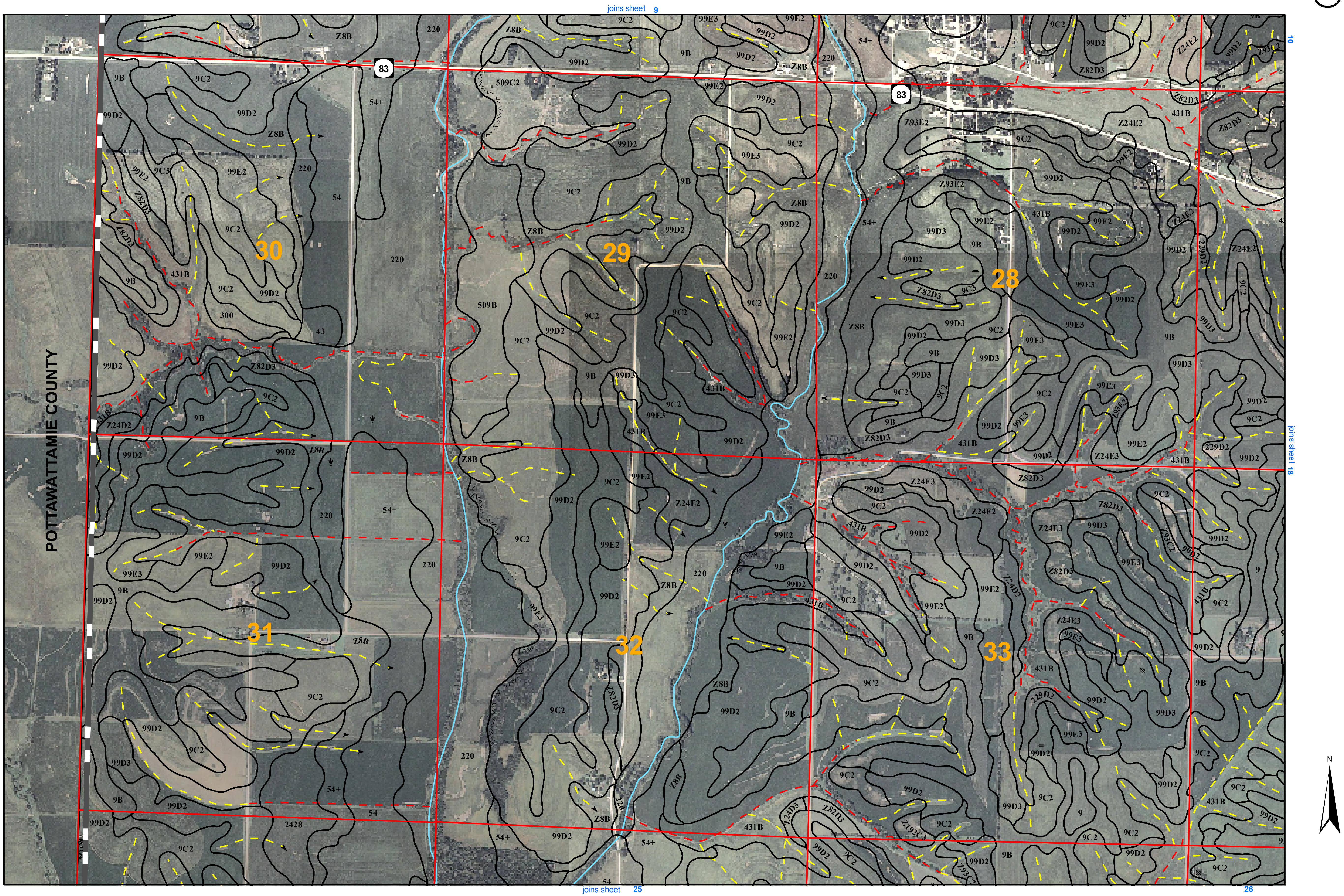
North American Datum of 1983 (NAD83), GRS-80 Spheroid. Universal Transverse Mercator, zone 15.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joins sheet 25
26
POTTAWATTAMIE COUNTY
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9C2
99D2
99D3
99E2
99E3
Z8B
220
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Z82D3
Z93E2
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Z24E3
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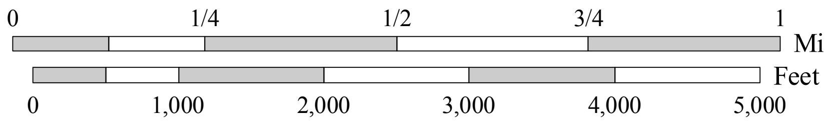
229D2


0
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Miles
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Feet

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Township 77N Range 37W

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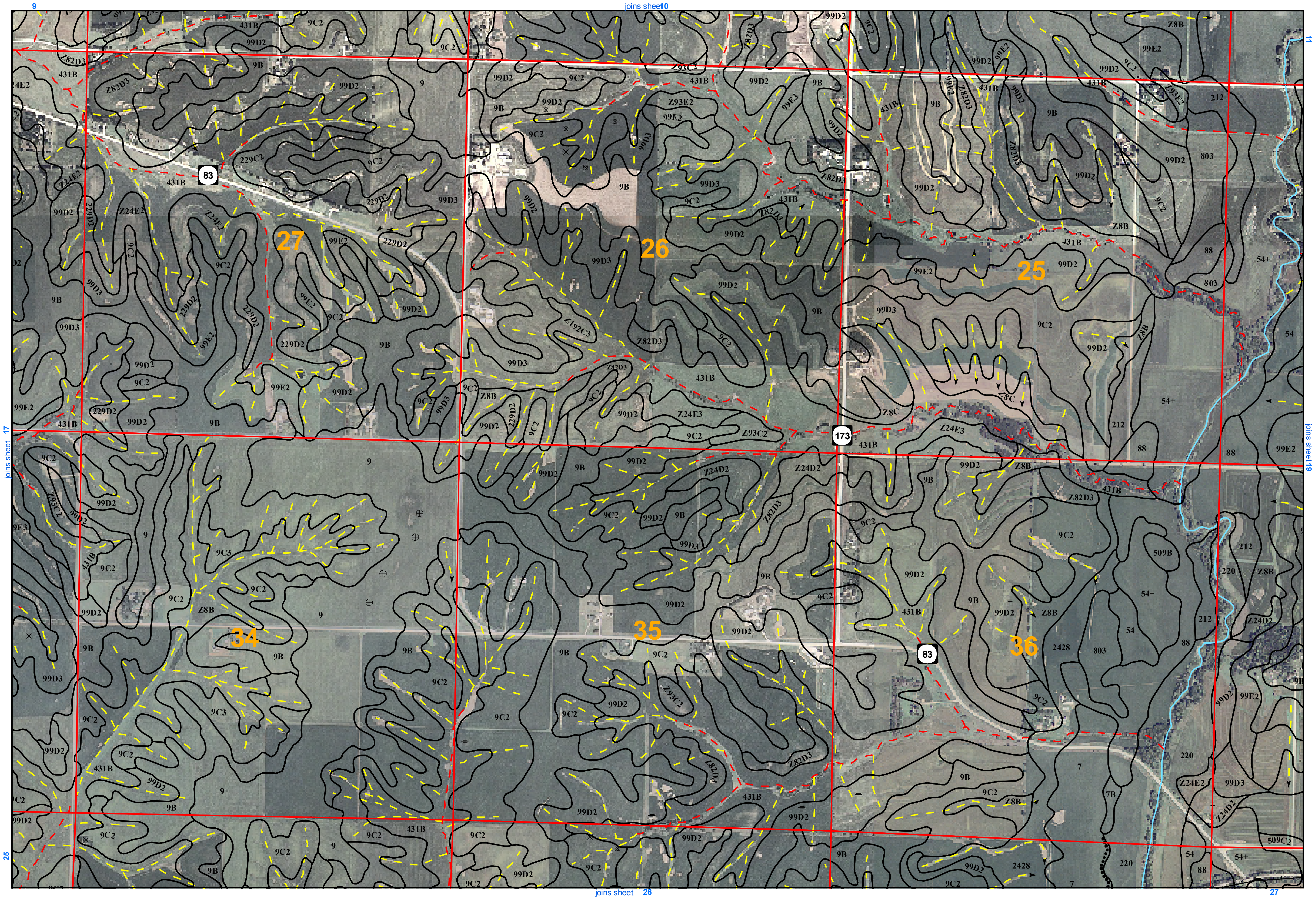

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joins sheet 19
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431B
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9B
Z82D3
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99E2
229D2
Z24E2
Z93E2
Z93C2
Z192C3
Z8B
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Z24D2
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Miles
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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 77N Range 36W

Soil Survey of Cass County, Iowa

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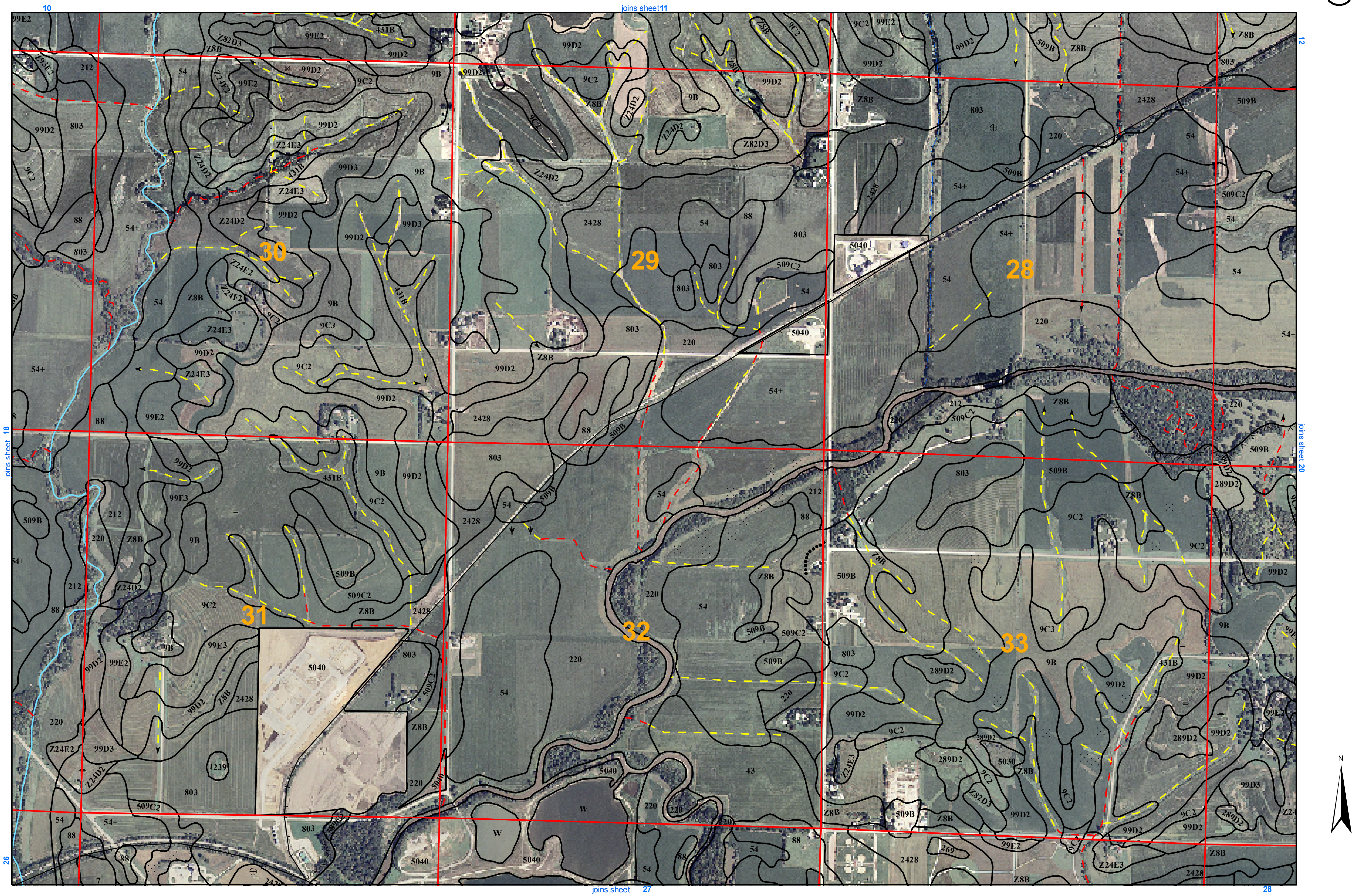
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 77N Range 36W

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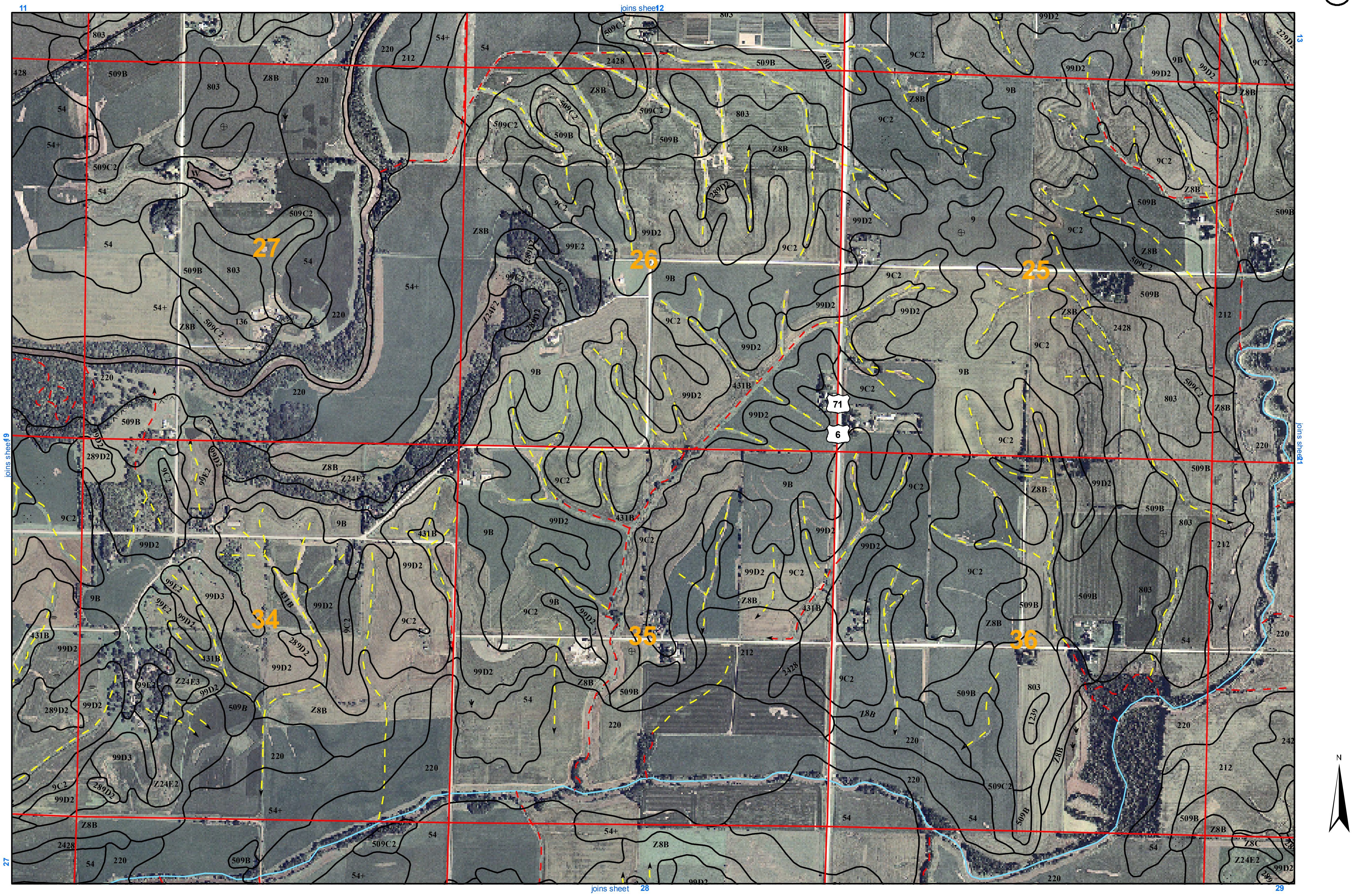

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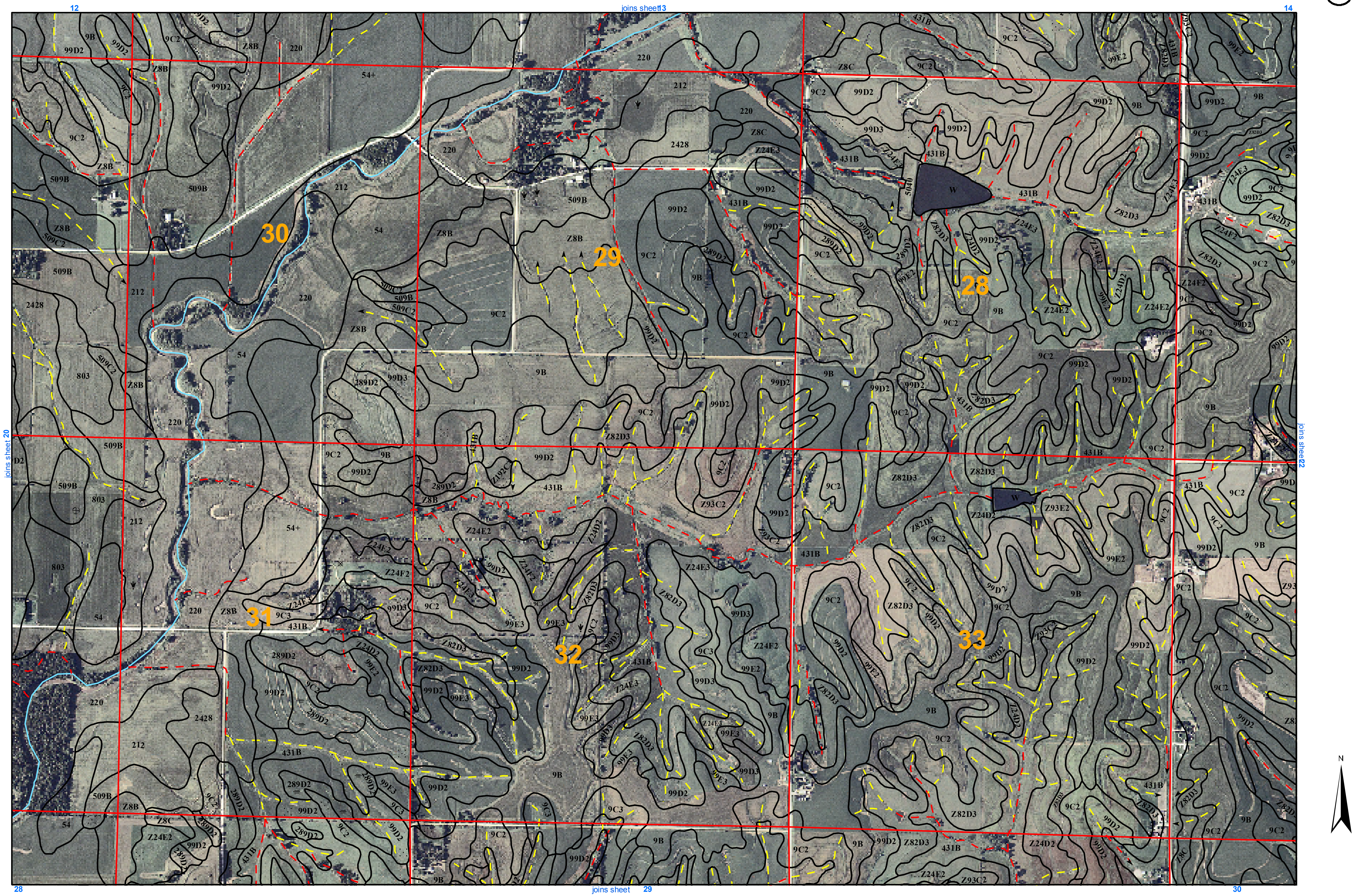
Township 77N Range 35W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9C2
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54+
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54
509C2
289D2
99D3
431B
Z82D3
Z24E2
Z24F2
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99E3
9C3
Z8C
5040
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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 77N Range 35W

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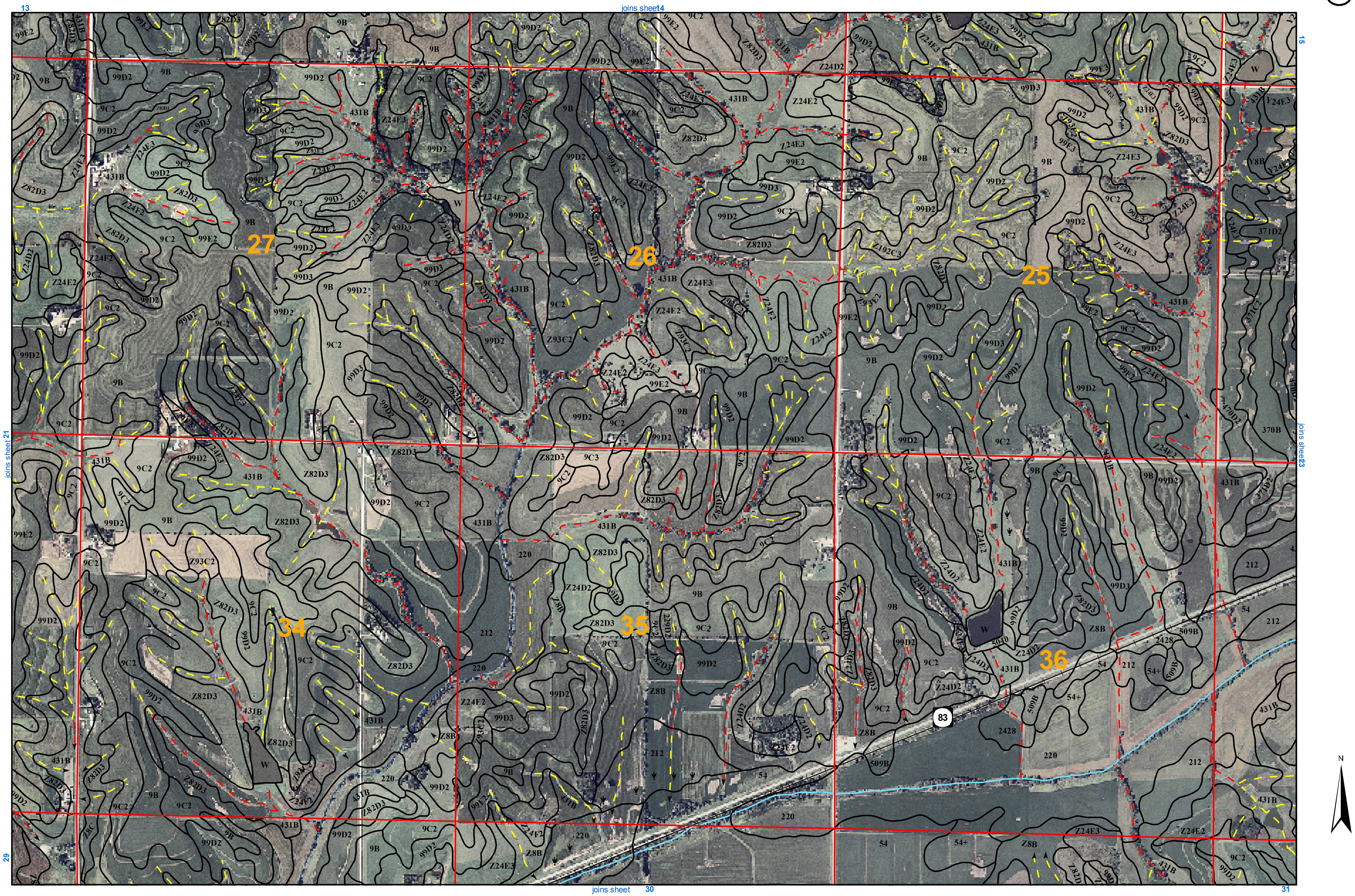
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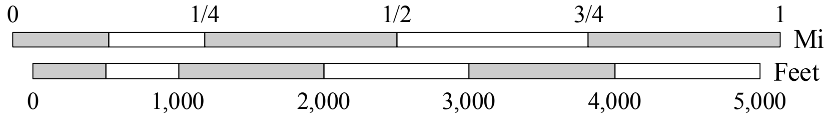
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Township 77N Range 34W

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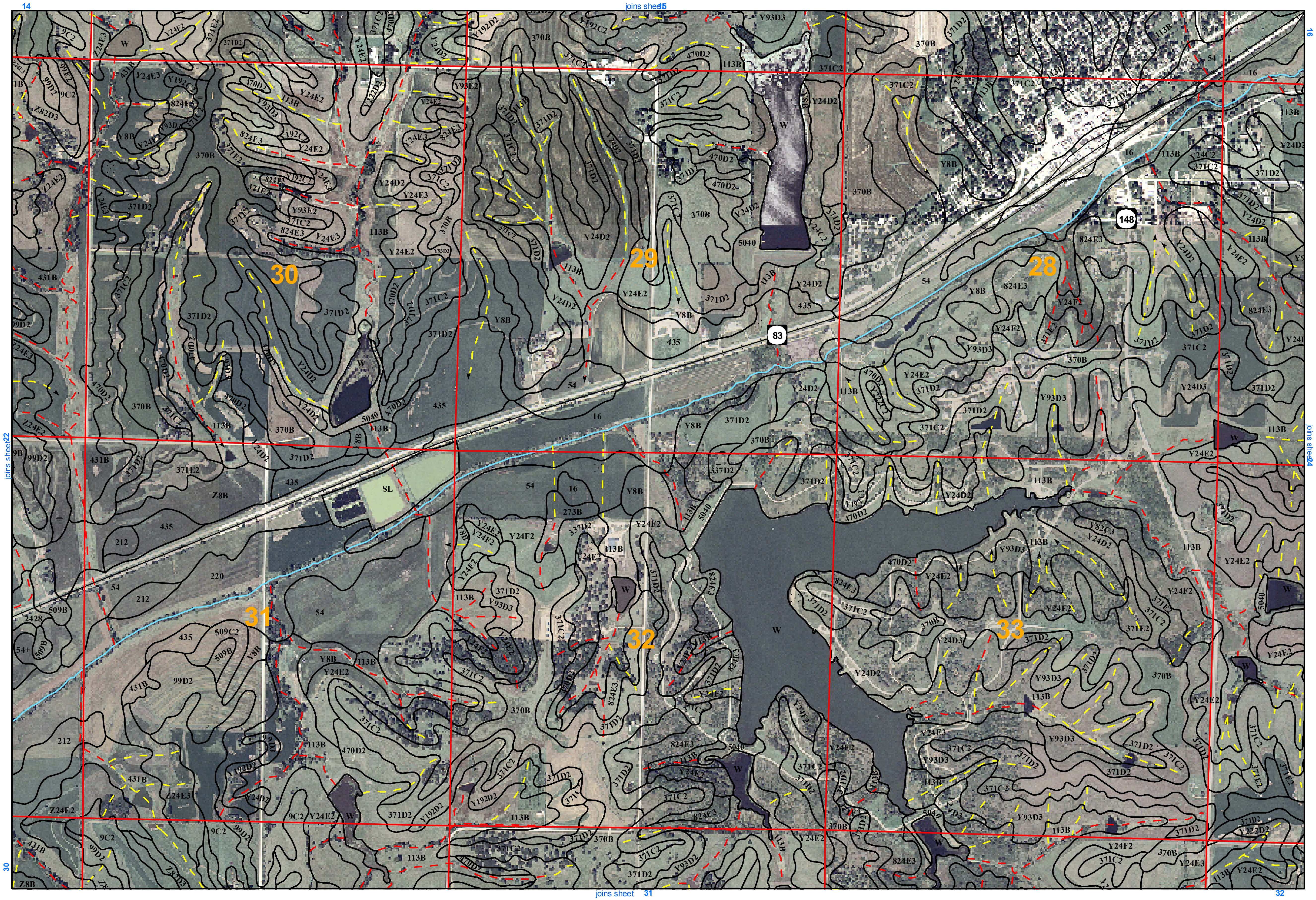
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.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Y93D3
824E3
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Y8B
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Z8B

0 1/4 1/2 3/4 1 Miles

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Township 77N Range 34W

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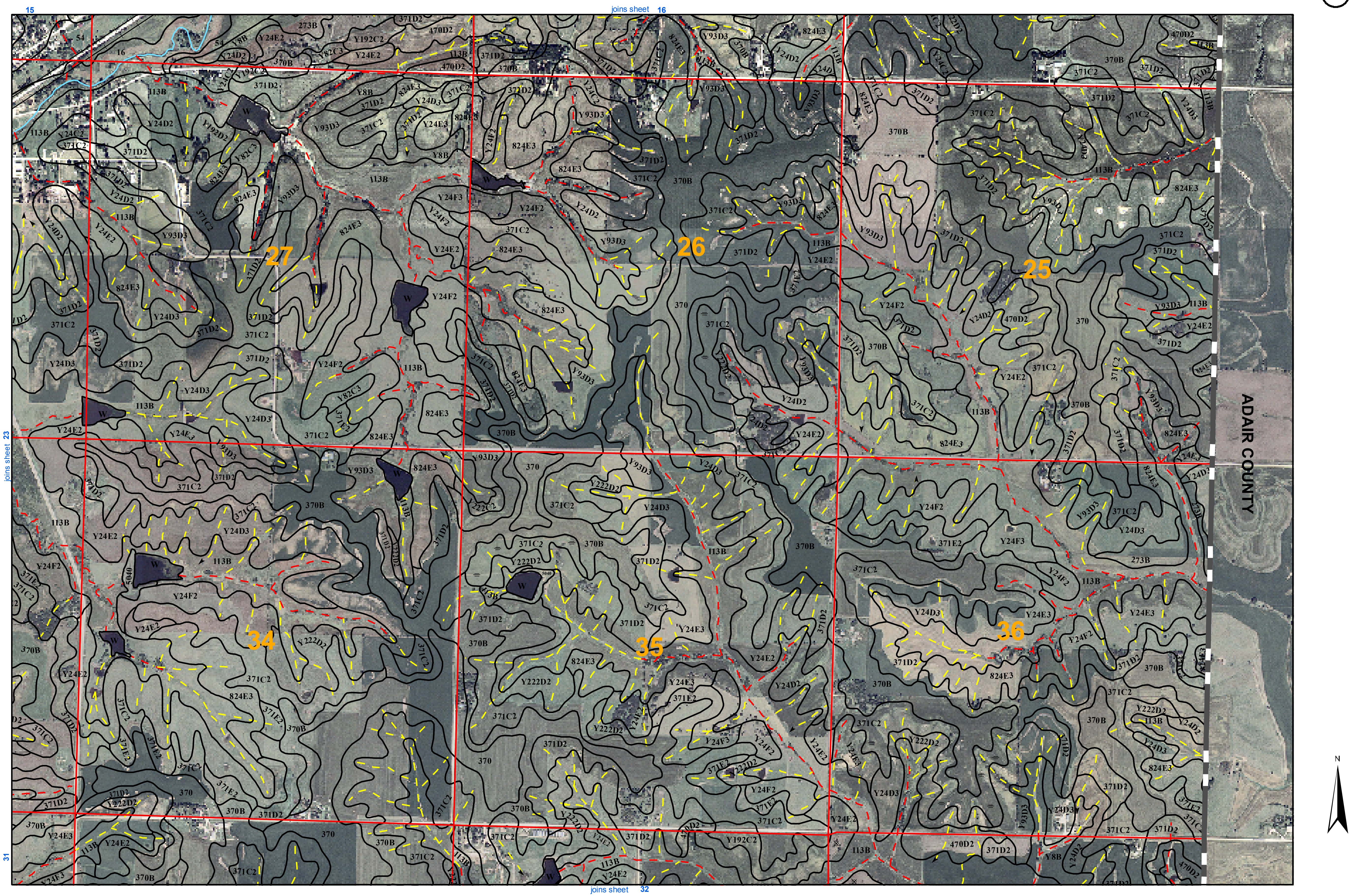
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ADAIR COUNTY
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Y24F2
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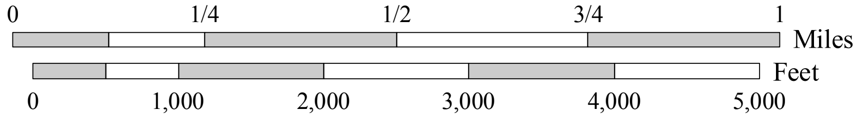
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Township 76N Range 37W

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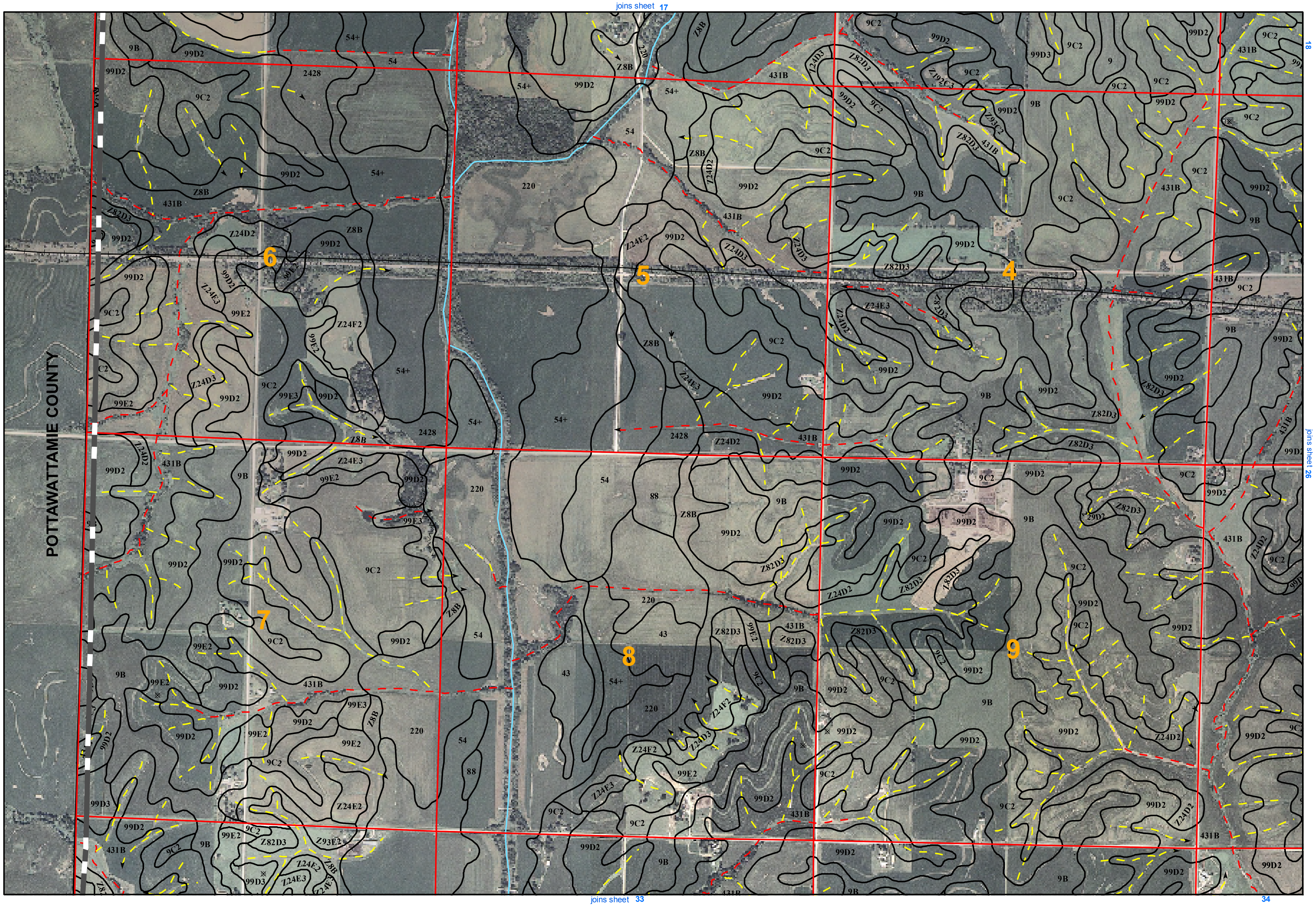
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.


joins sheet 17
18
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34
POTTAWATTAMIE COUNTY
6
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99D2
9C2
9B
431B
54+
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Z8B
Z24D2
Z24E3
Z82D3
99E2
43
88

N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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26

Township 76N Range 37W

26

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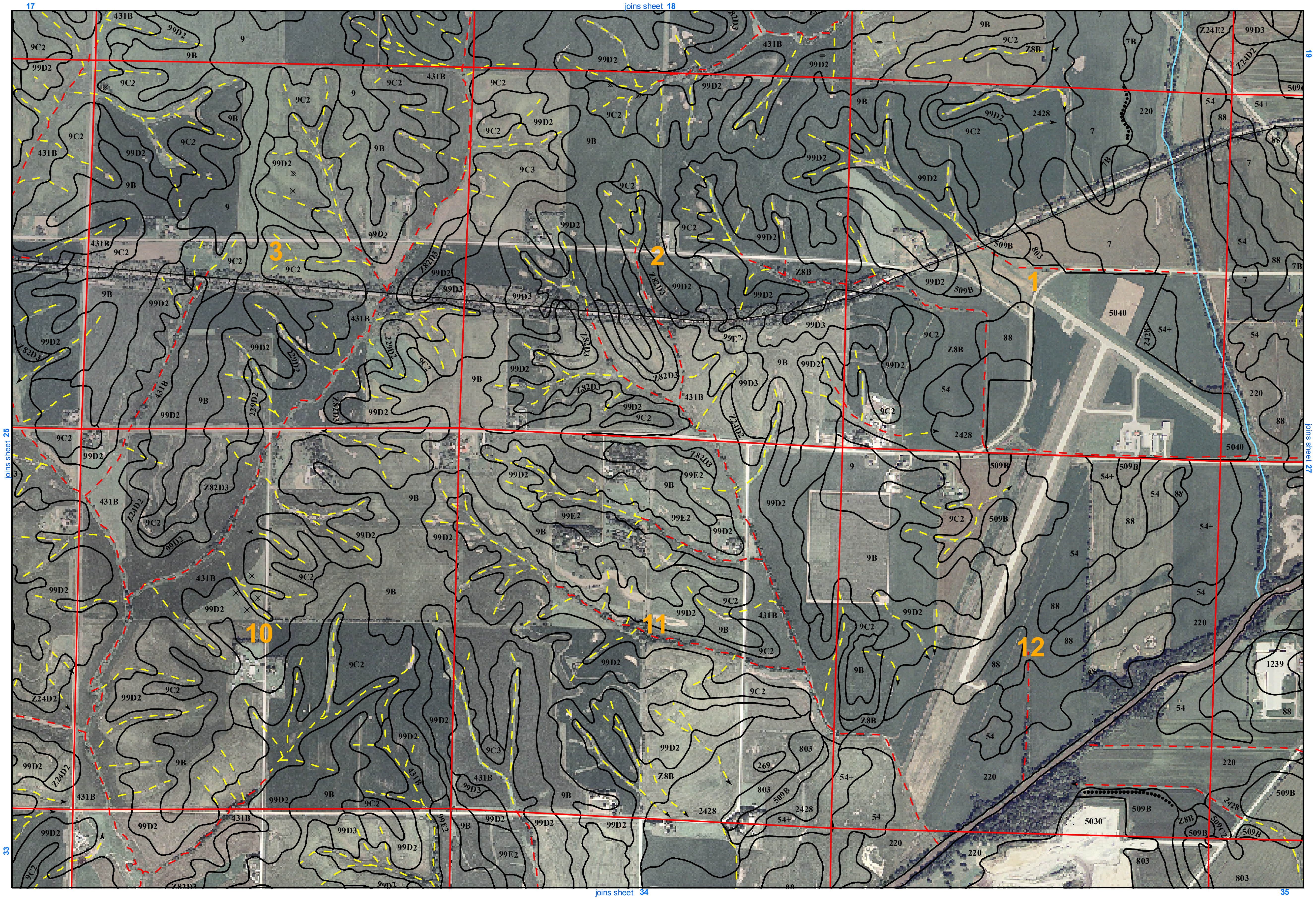
17
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2428
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509B
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1239
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Z82D3
Z29D2
Z20D2
N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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27

Township 76N Range 36W

27

Soil Survey of Cass County, Iowa

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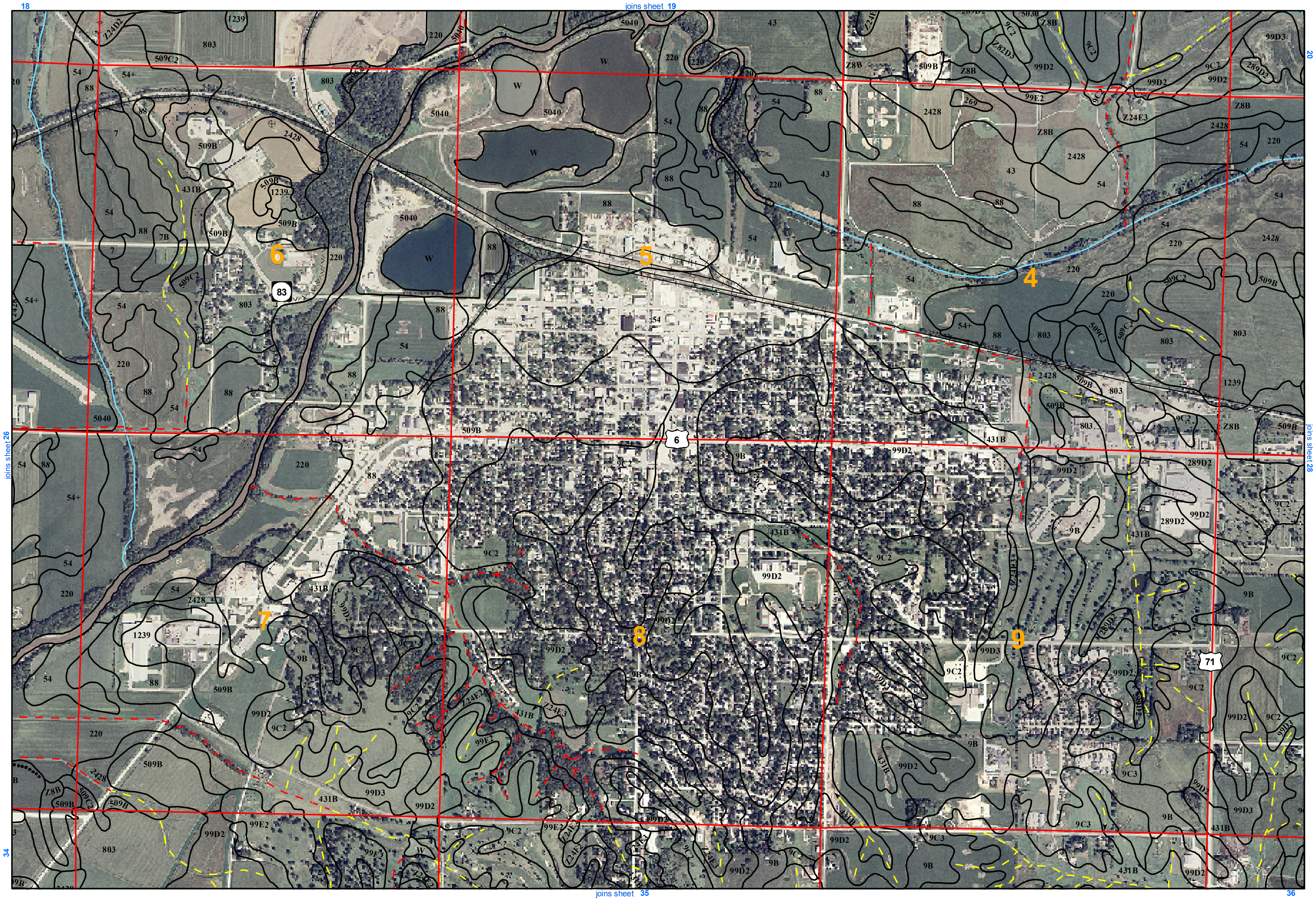
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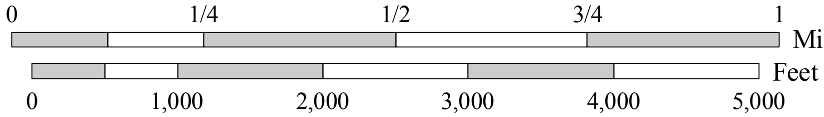
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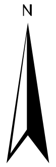

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Township 76N Range 36W

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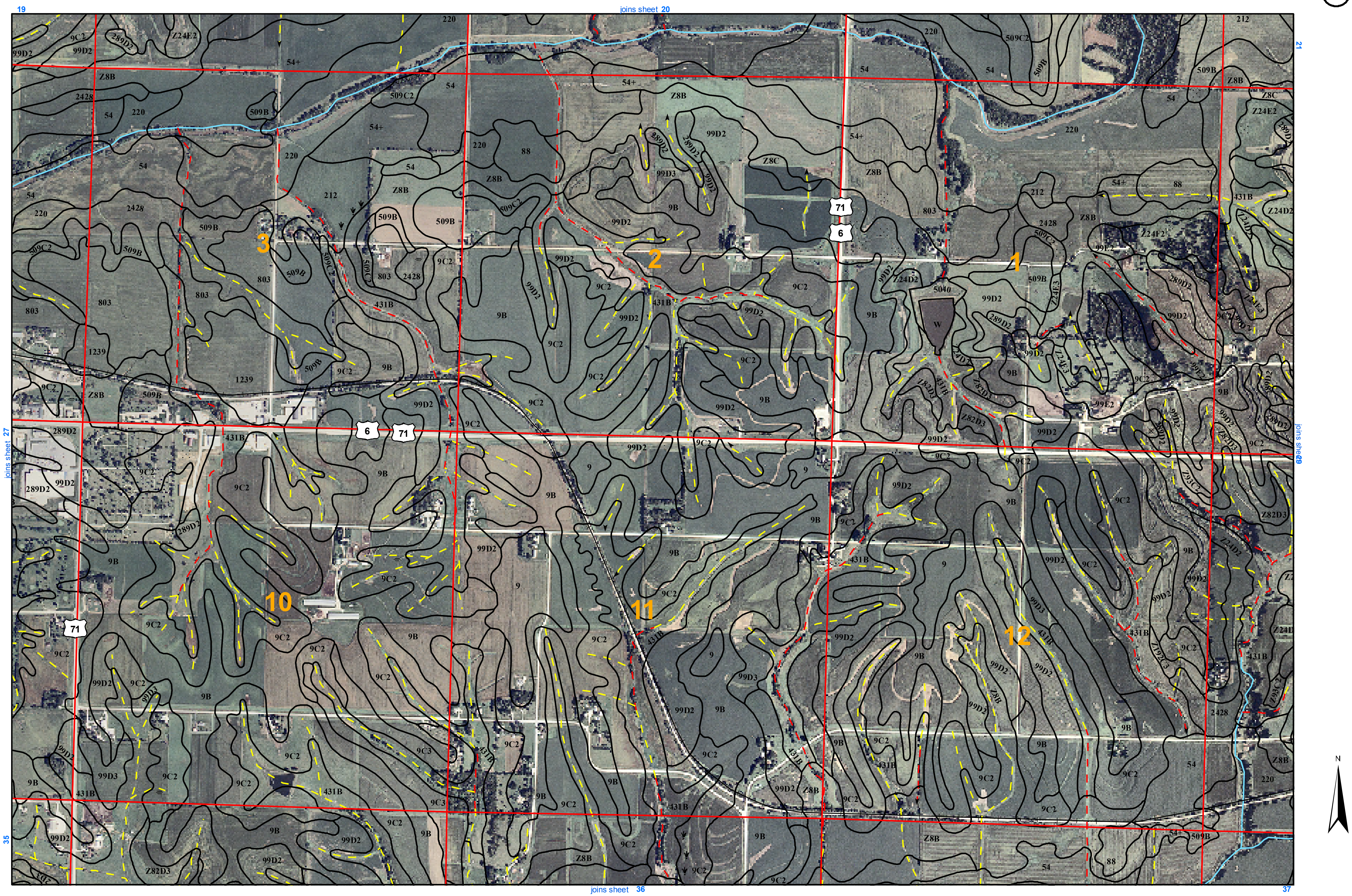
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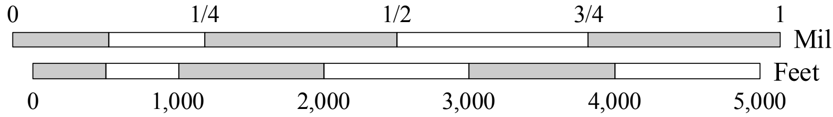
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Township 76N Range 35W

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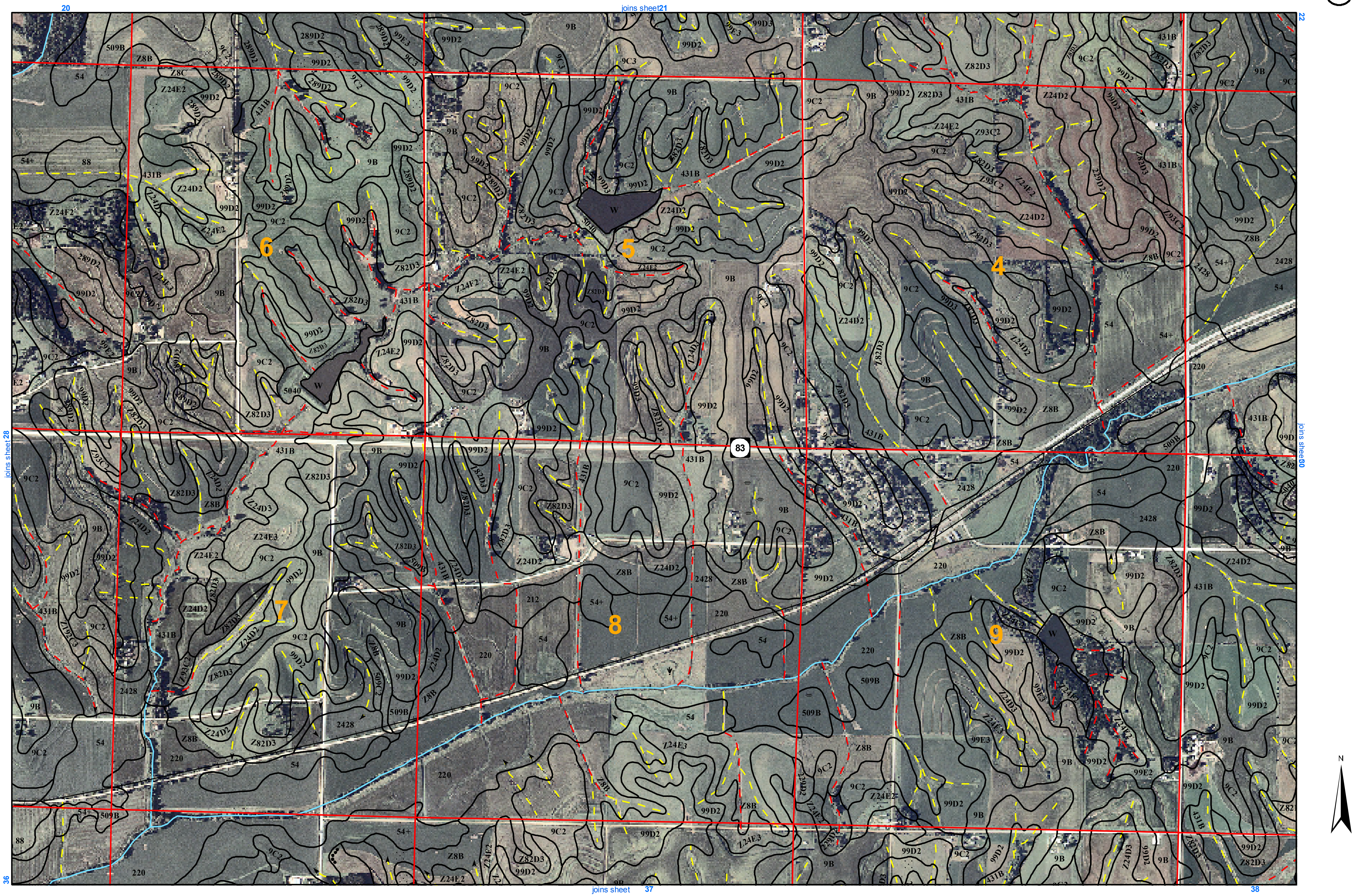
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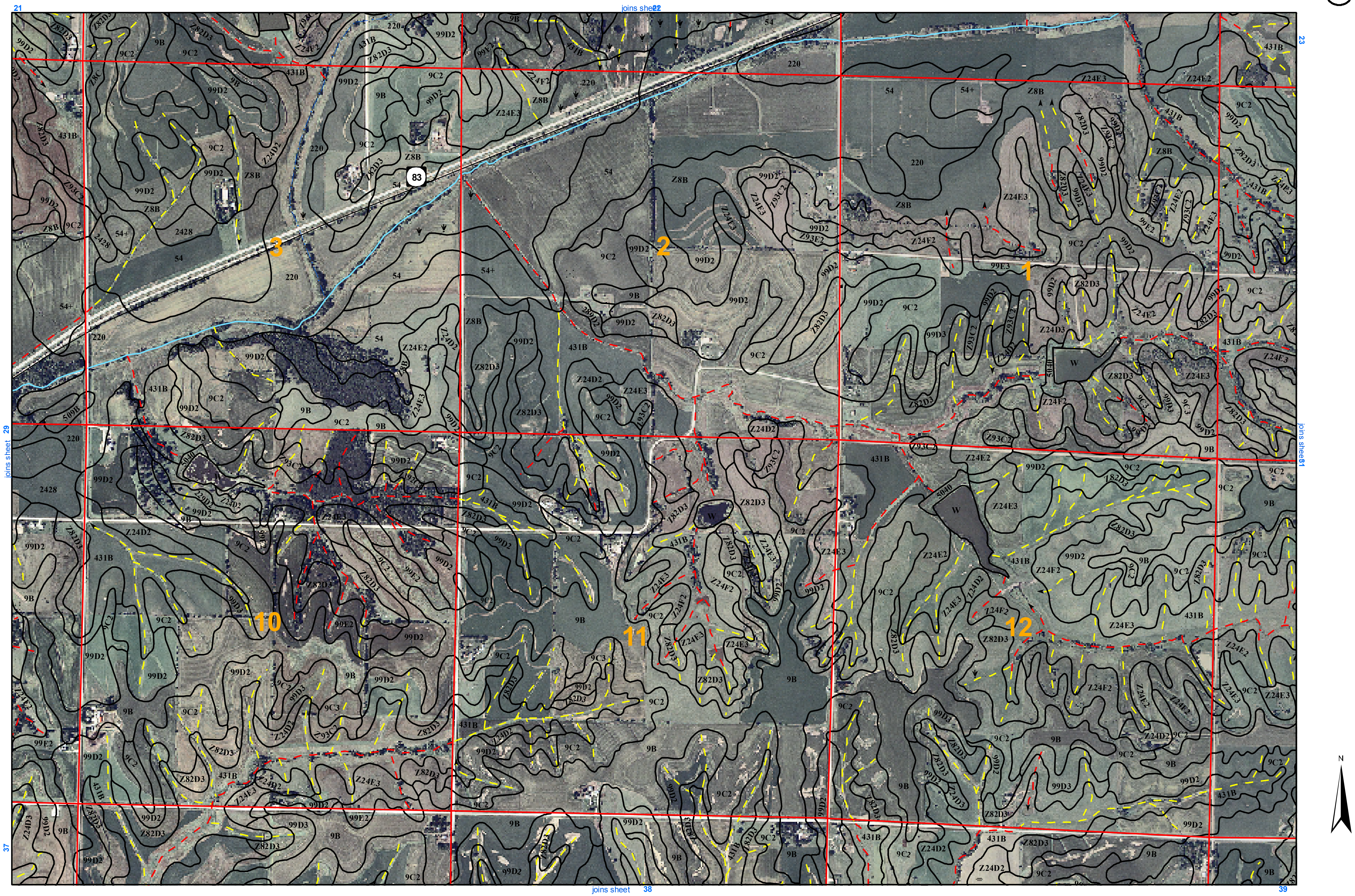

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Township 76N Range 34W

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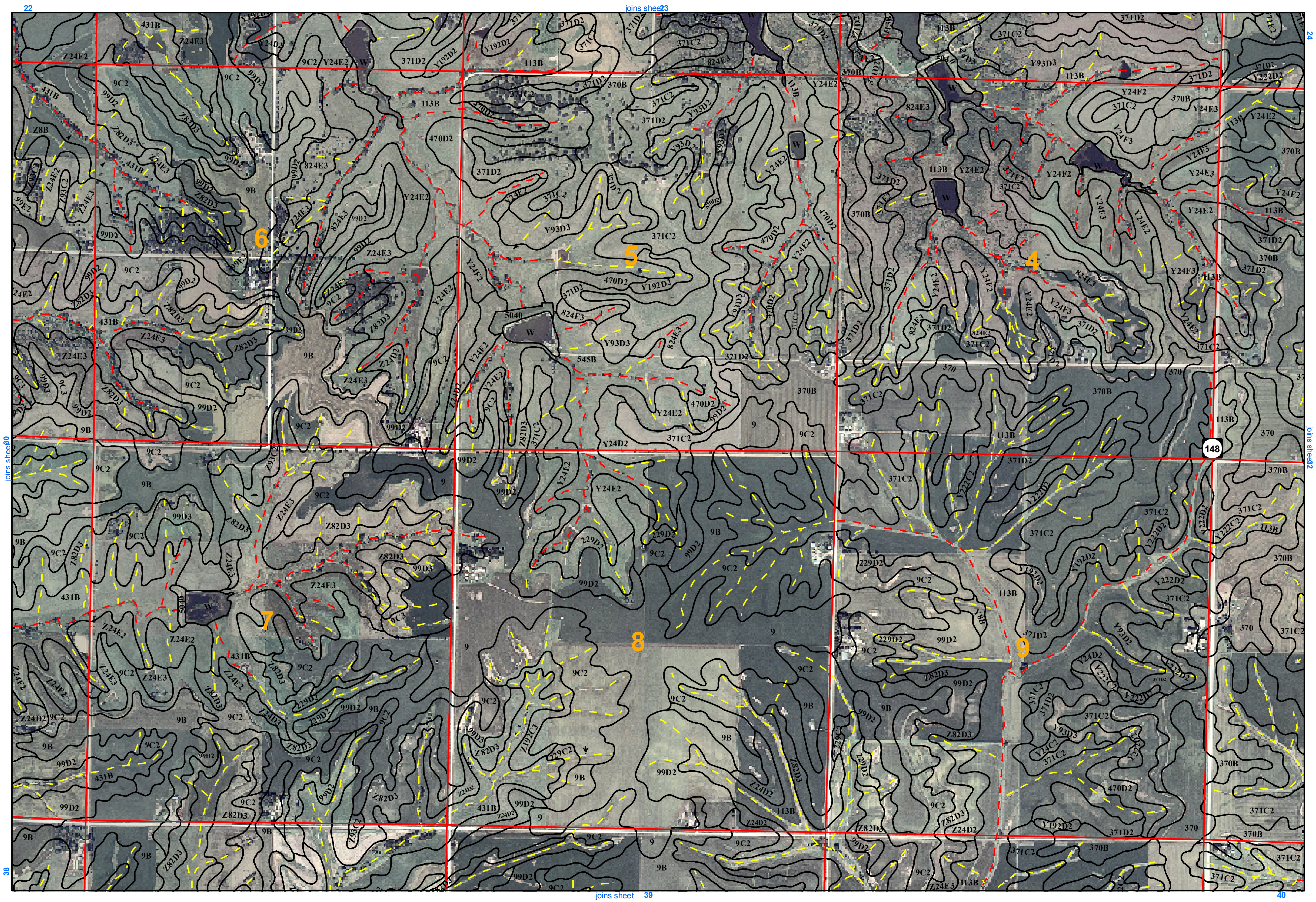
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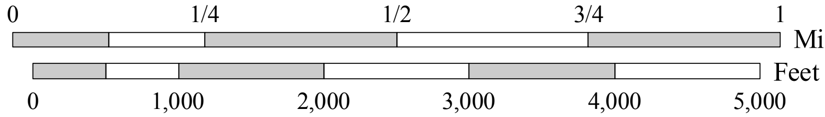
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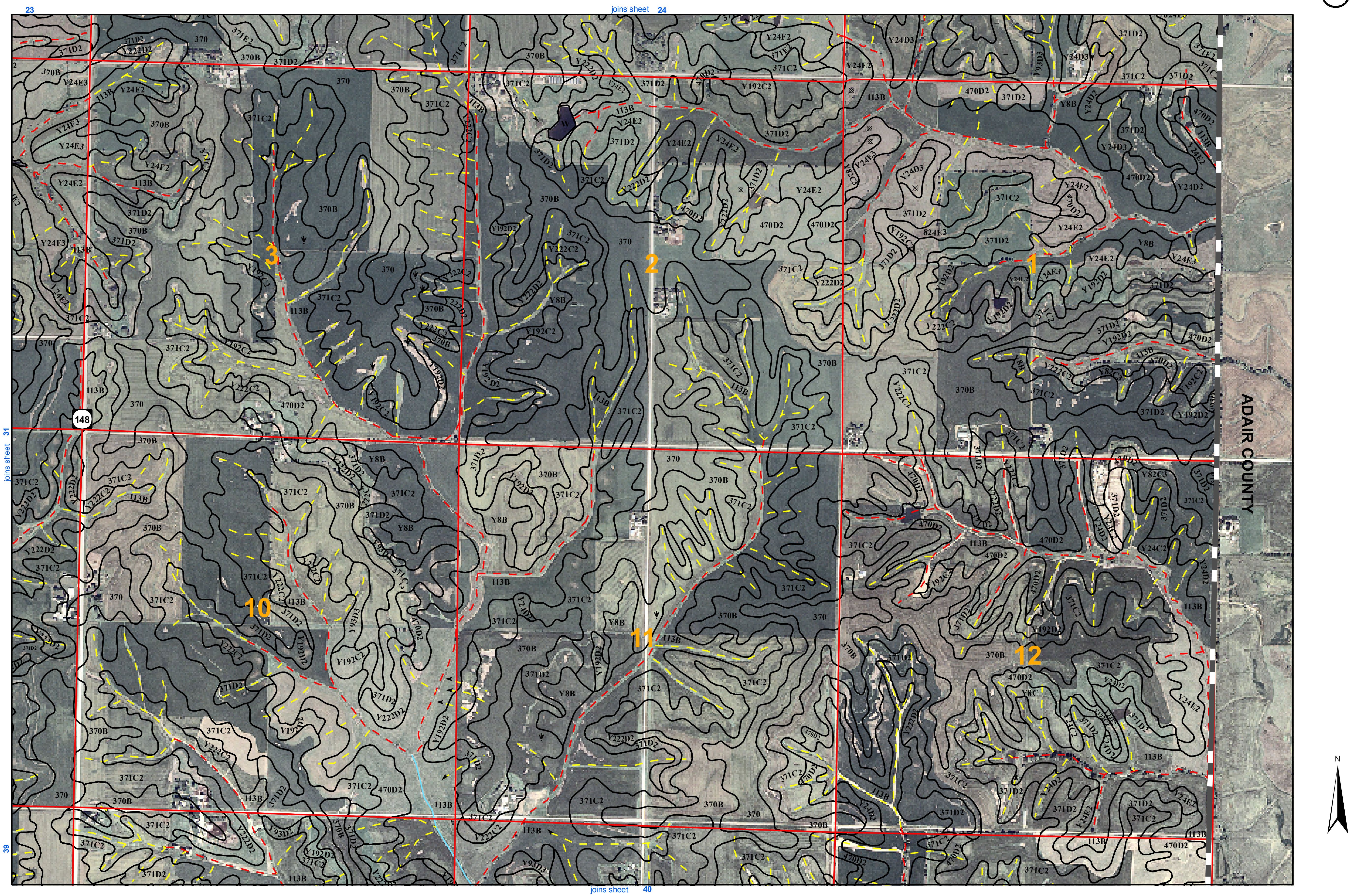
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.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ADAIR COUNTY
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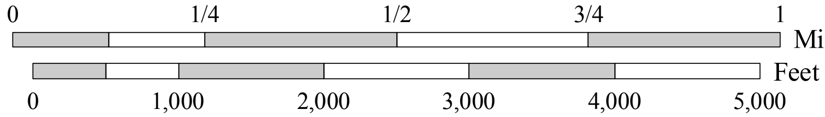
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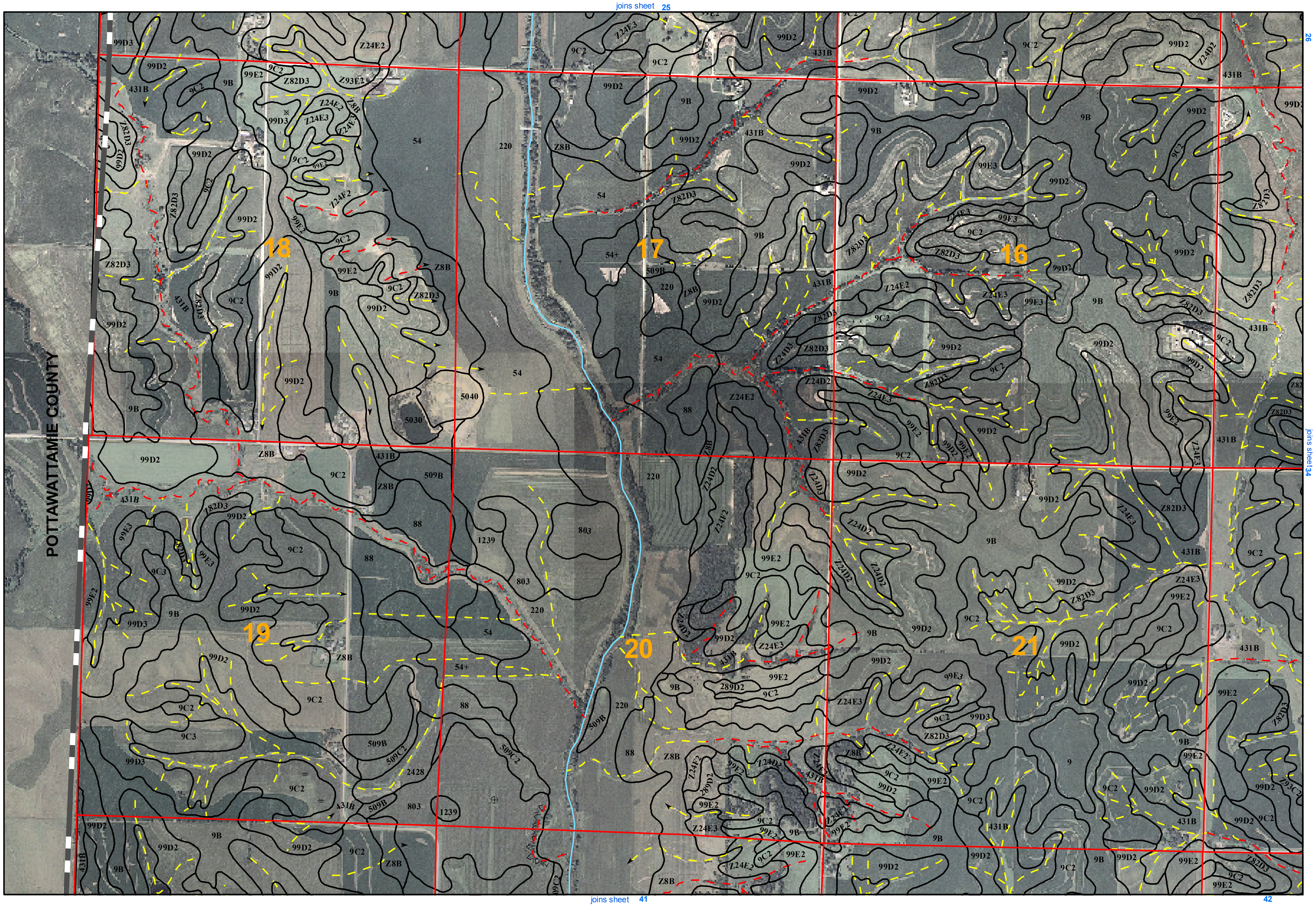

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POTTAWATTAMIE COUNTY
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Z93E2
Z24E2
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Z24F2
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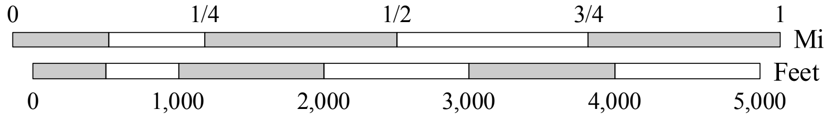

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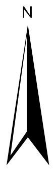

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 76N Range 37W

Soil Survey of Cass County, Iowa

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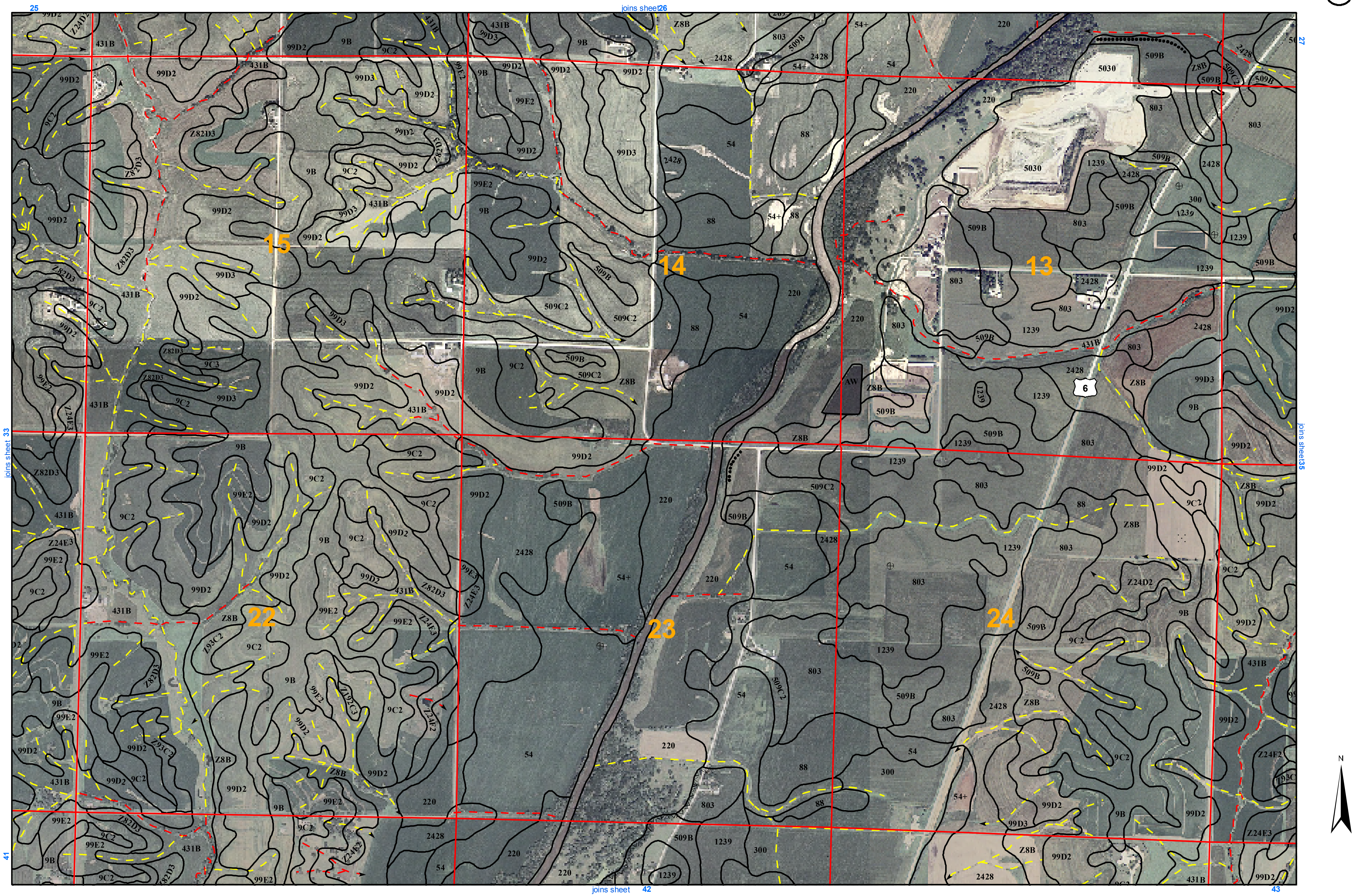
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.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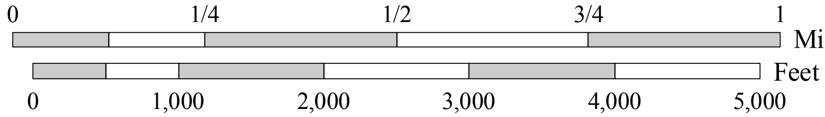
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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 76N Range 36W

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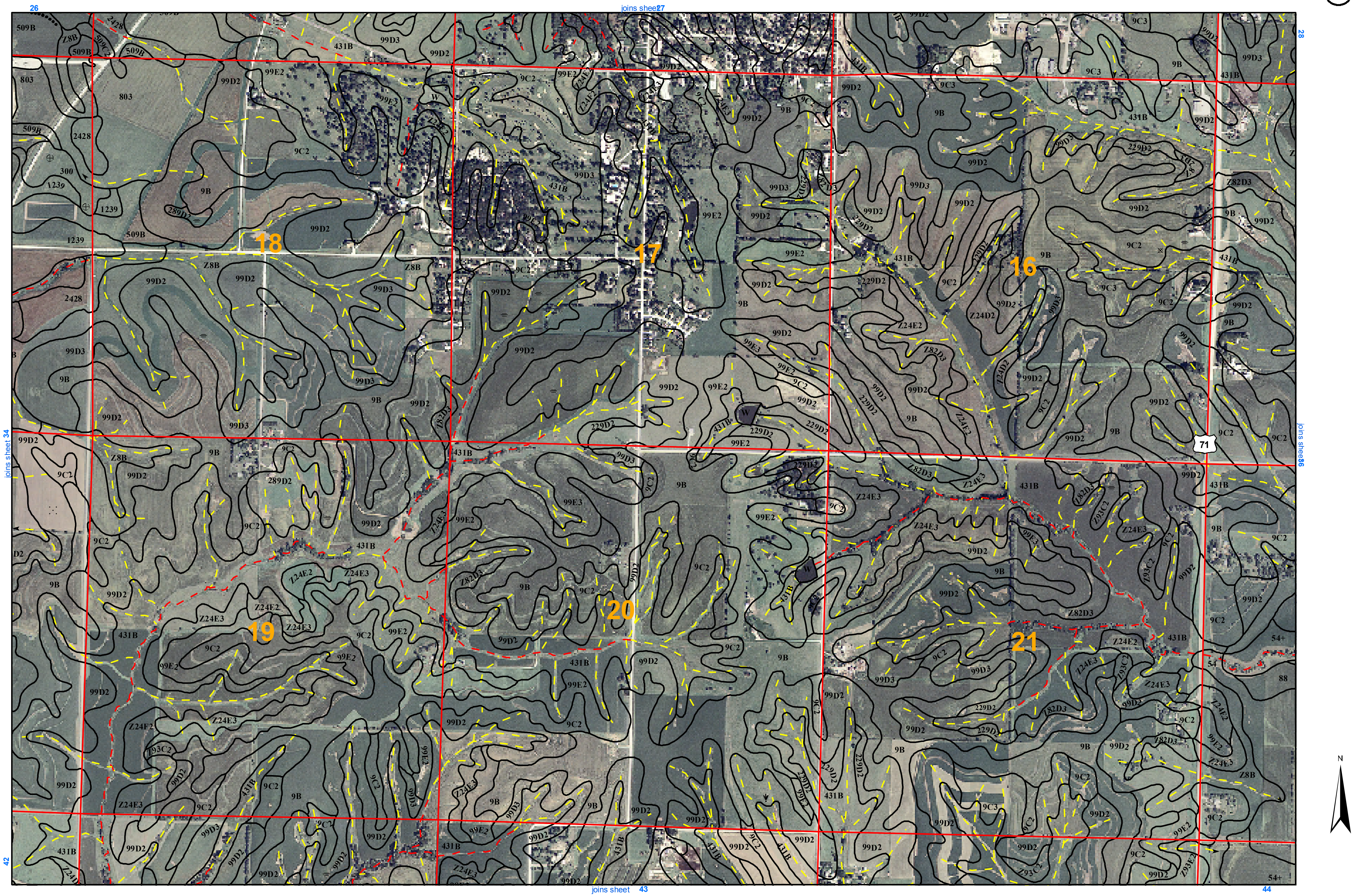
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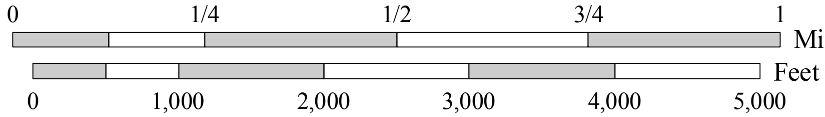
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Township 76N Range 36W

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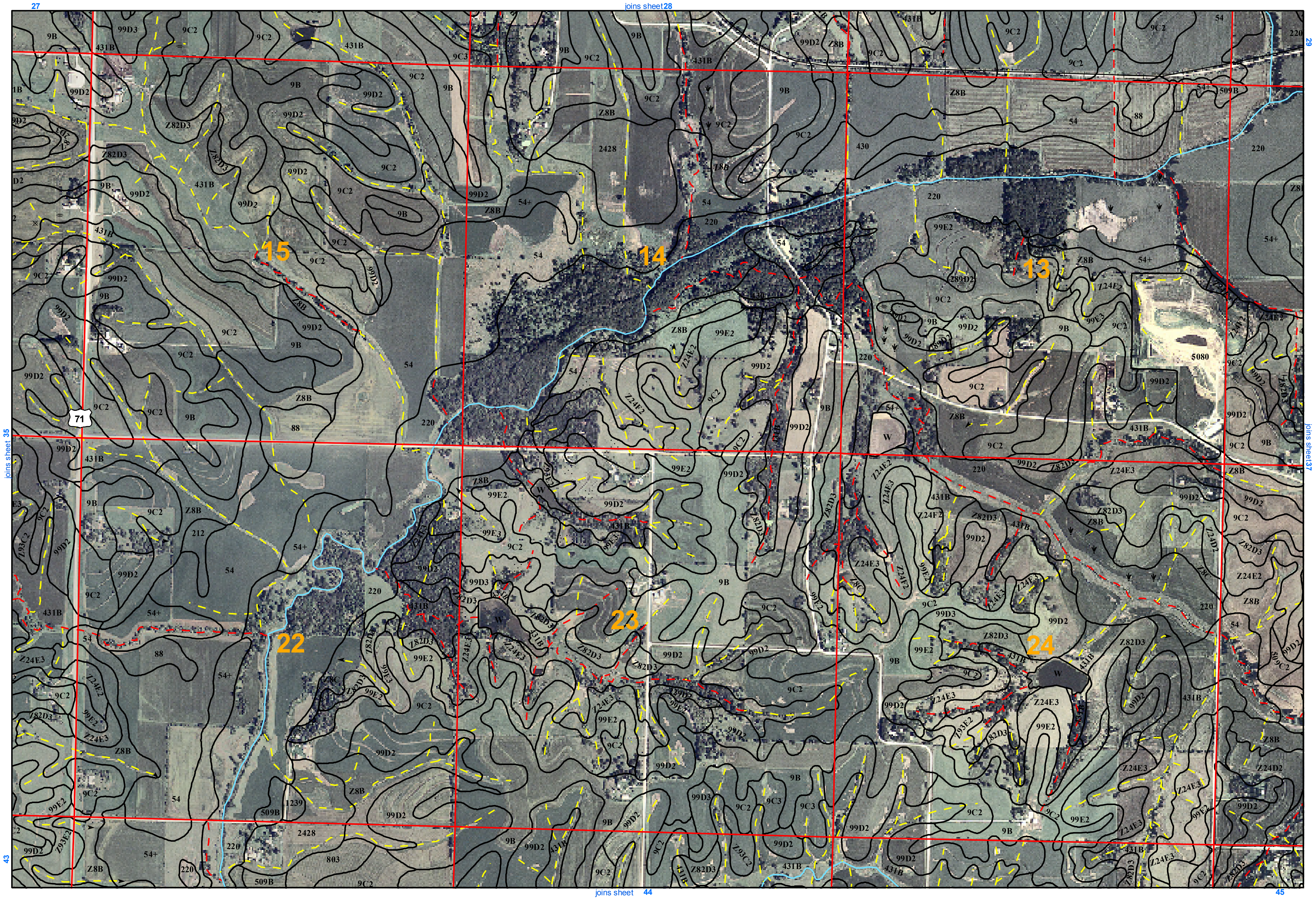
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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 76N Range 35W

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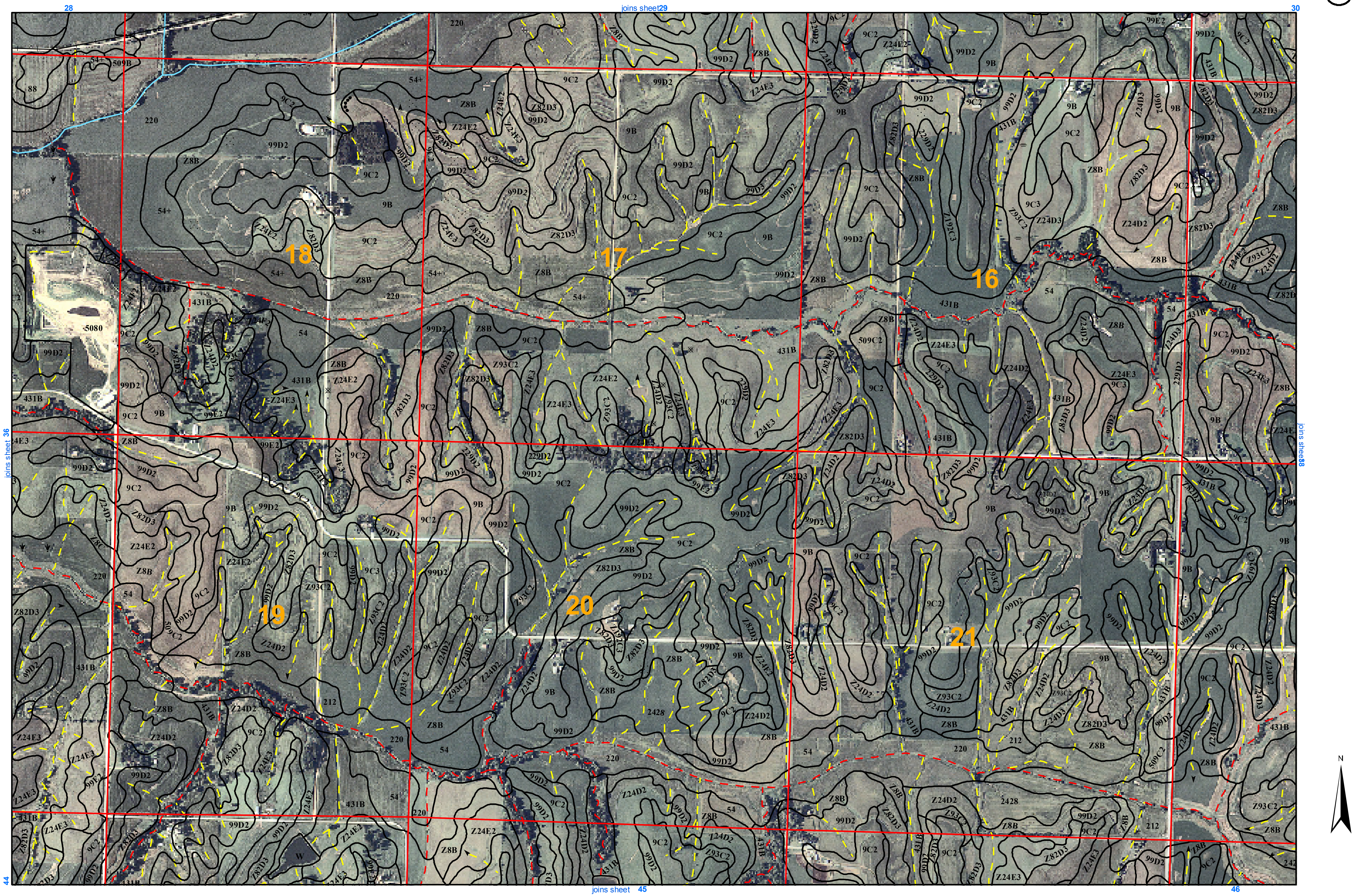
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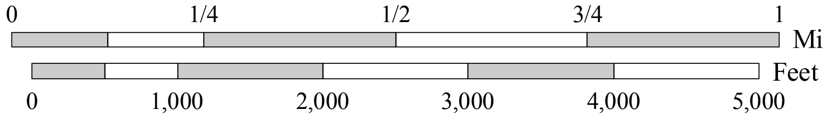
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United States Department of Agriculture
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Township 76N Range 35W

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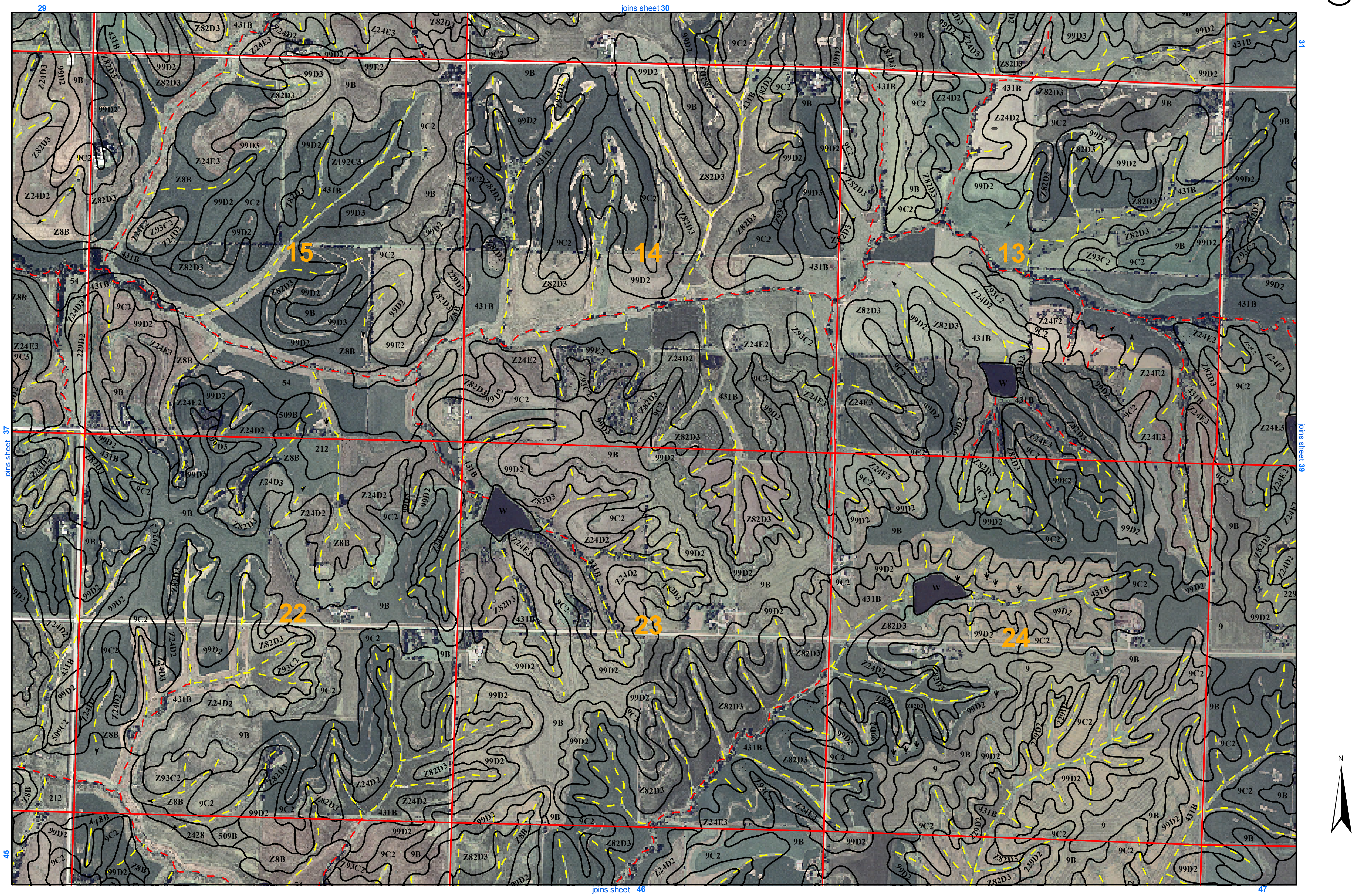
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United States Department of Agriculture
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Township 76N Range 34W

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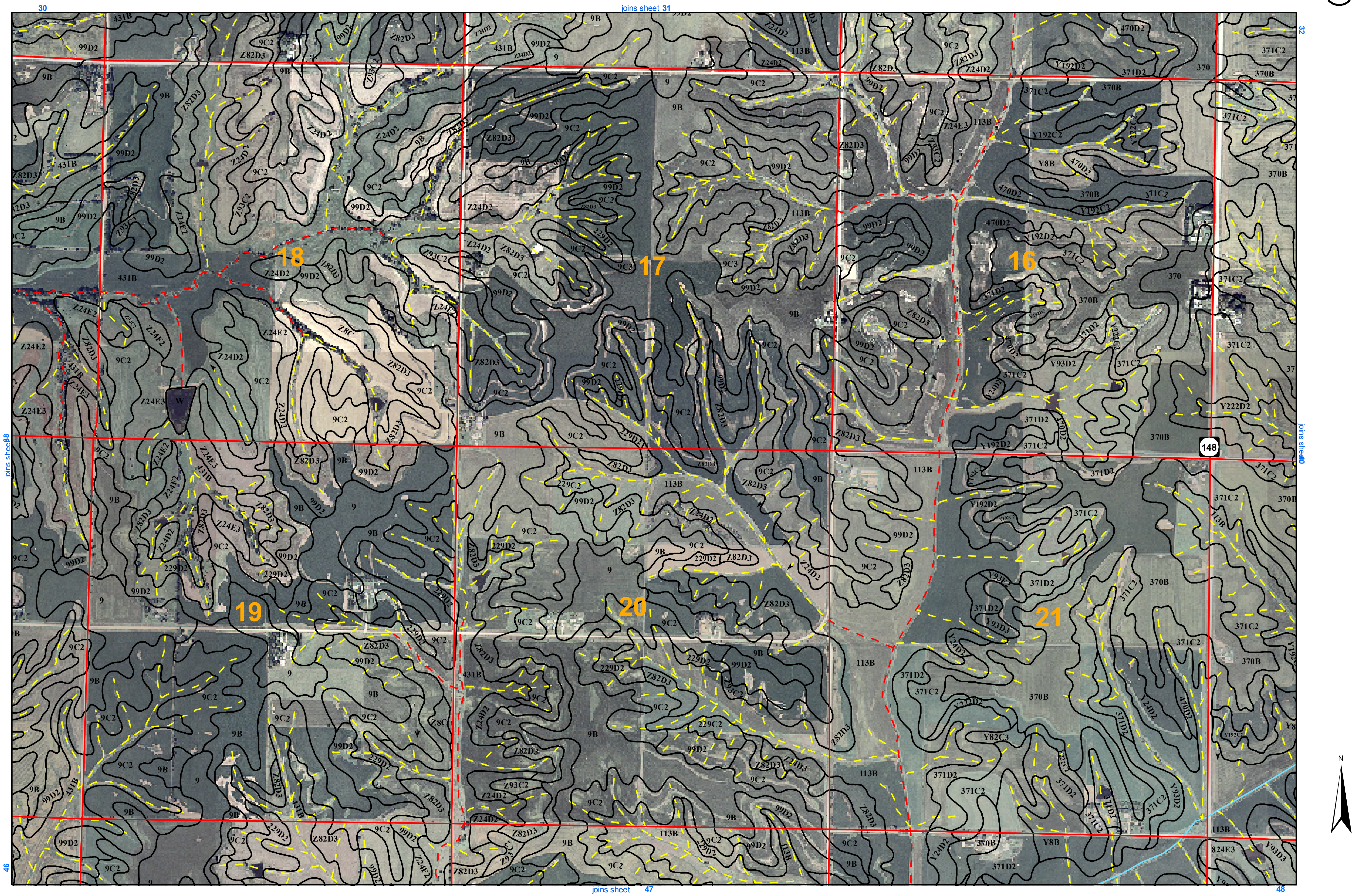
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.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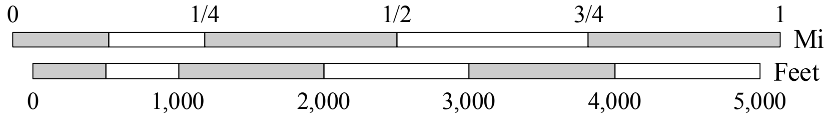
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Township 76N Range 34W

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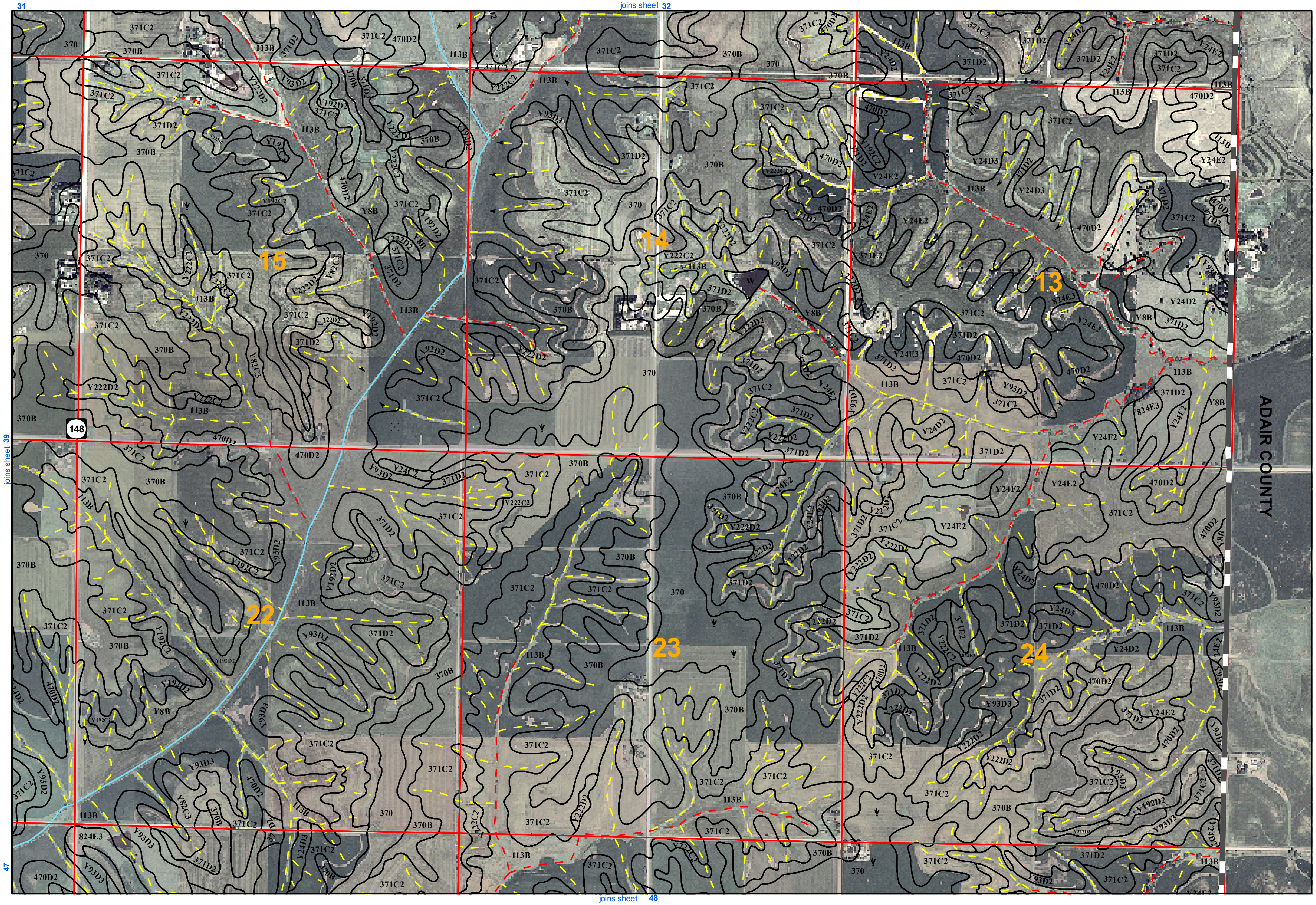
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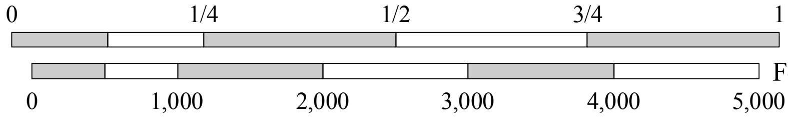
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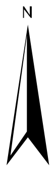

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Township 76N Range 37W

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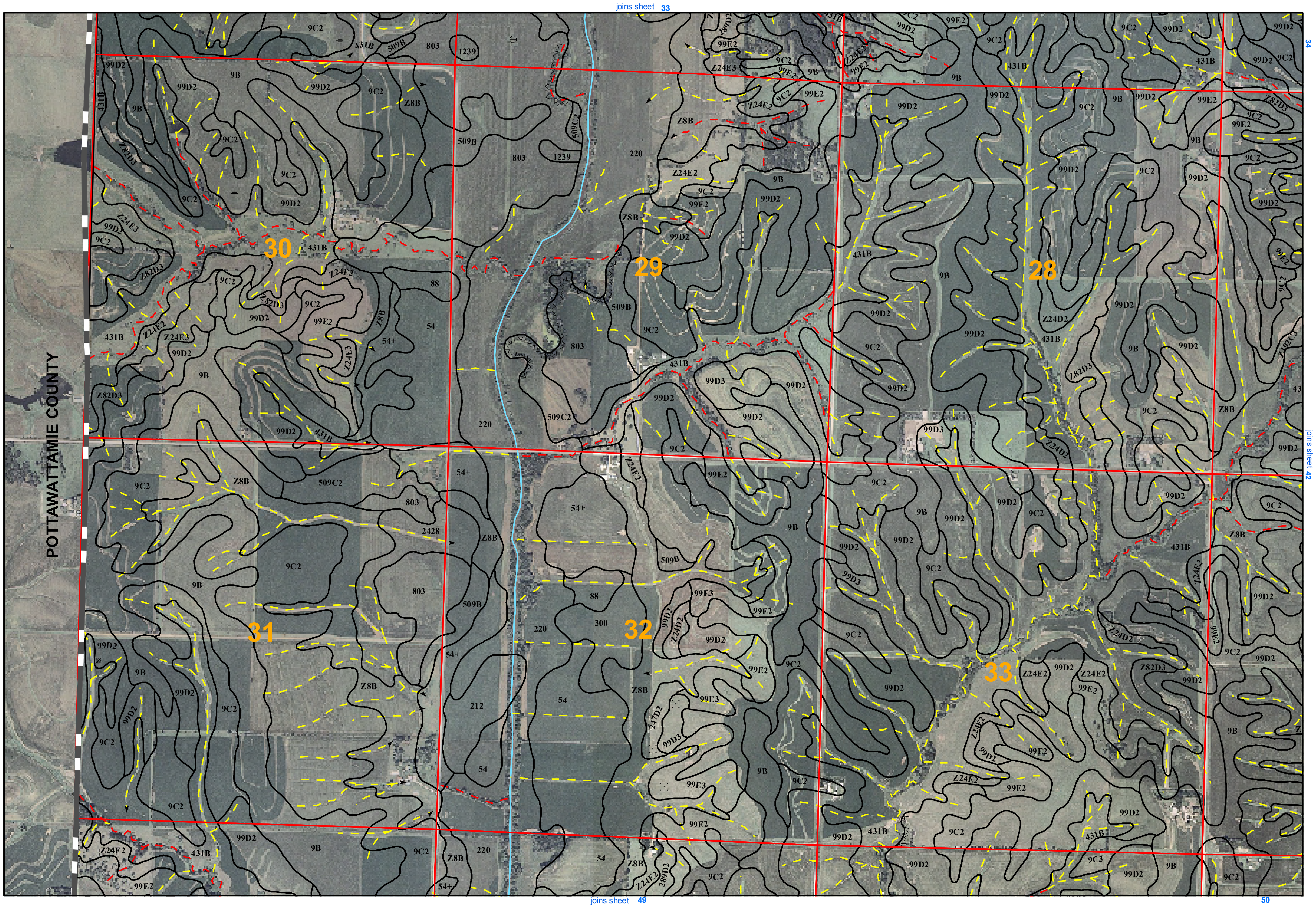
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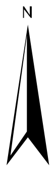

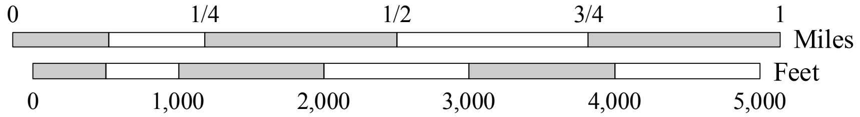
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Township 76N Range 37W

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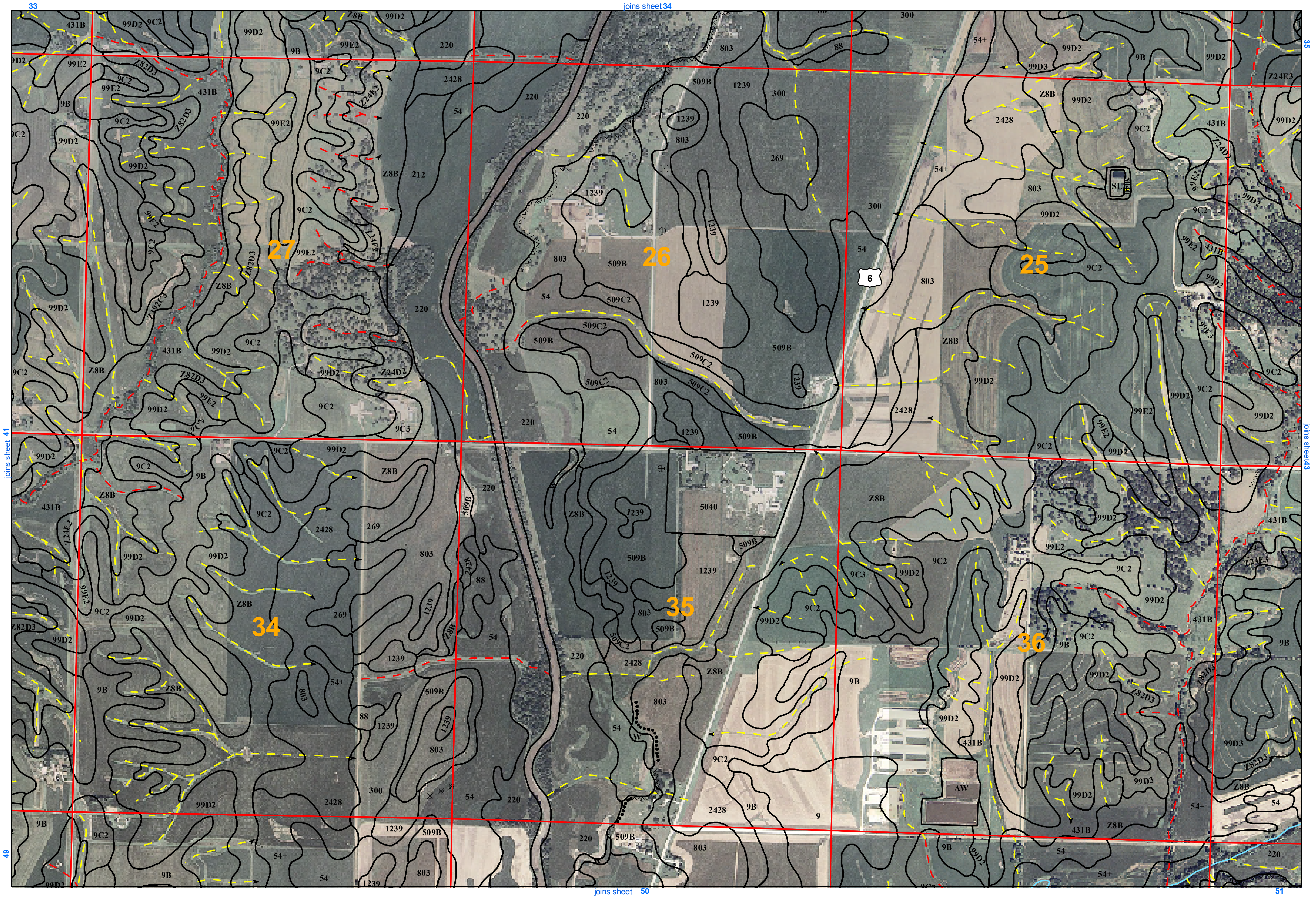
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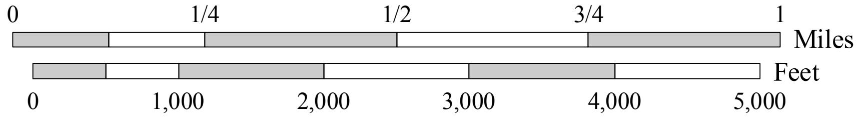
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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 76N Range 36W

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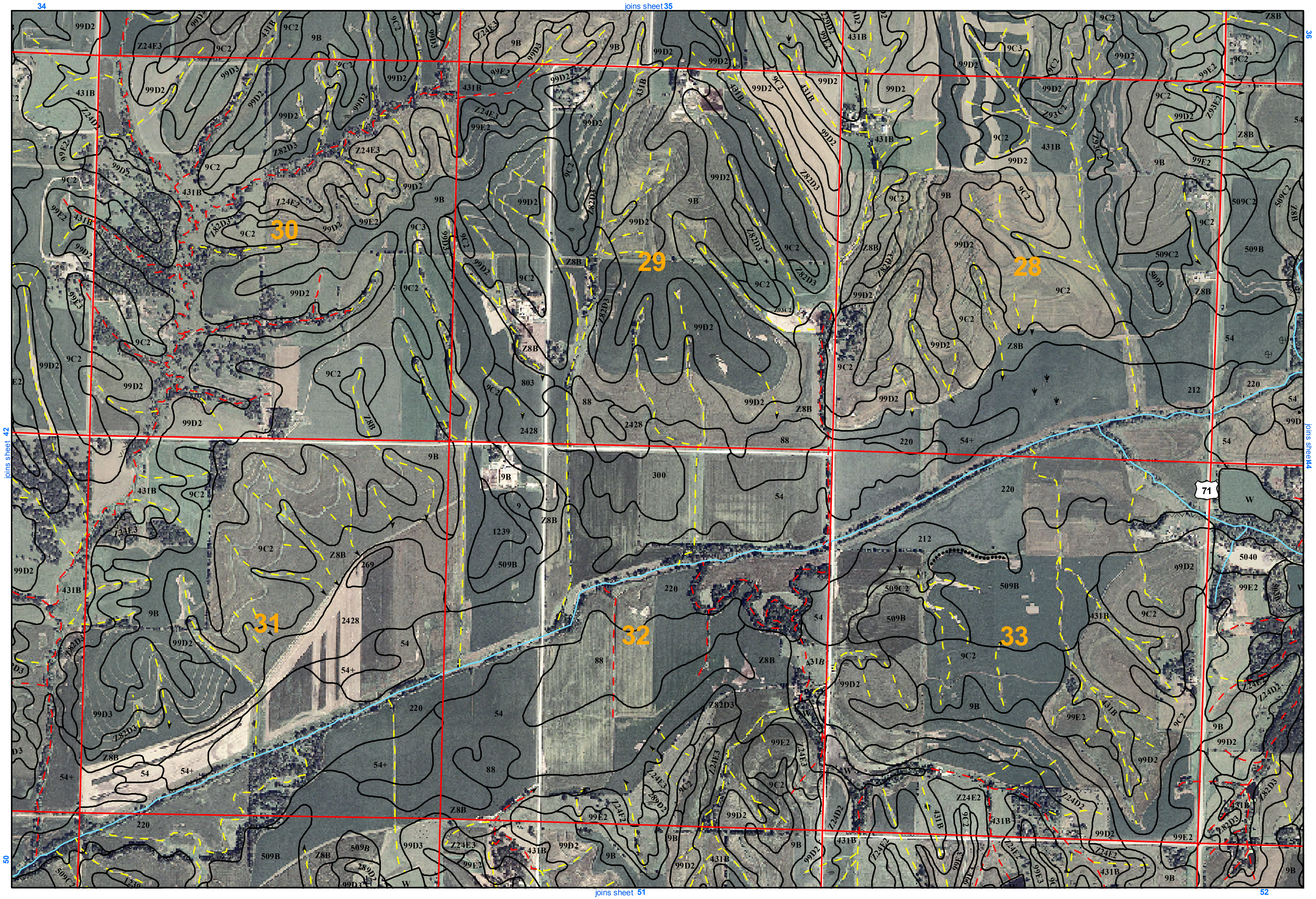
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Township 76N Range 36W

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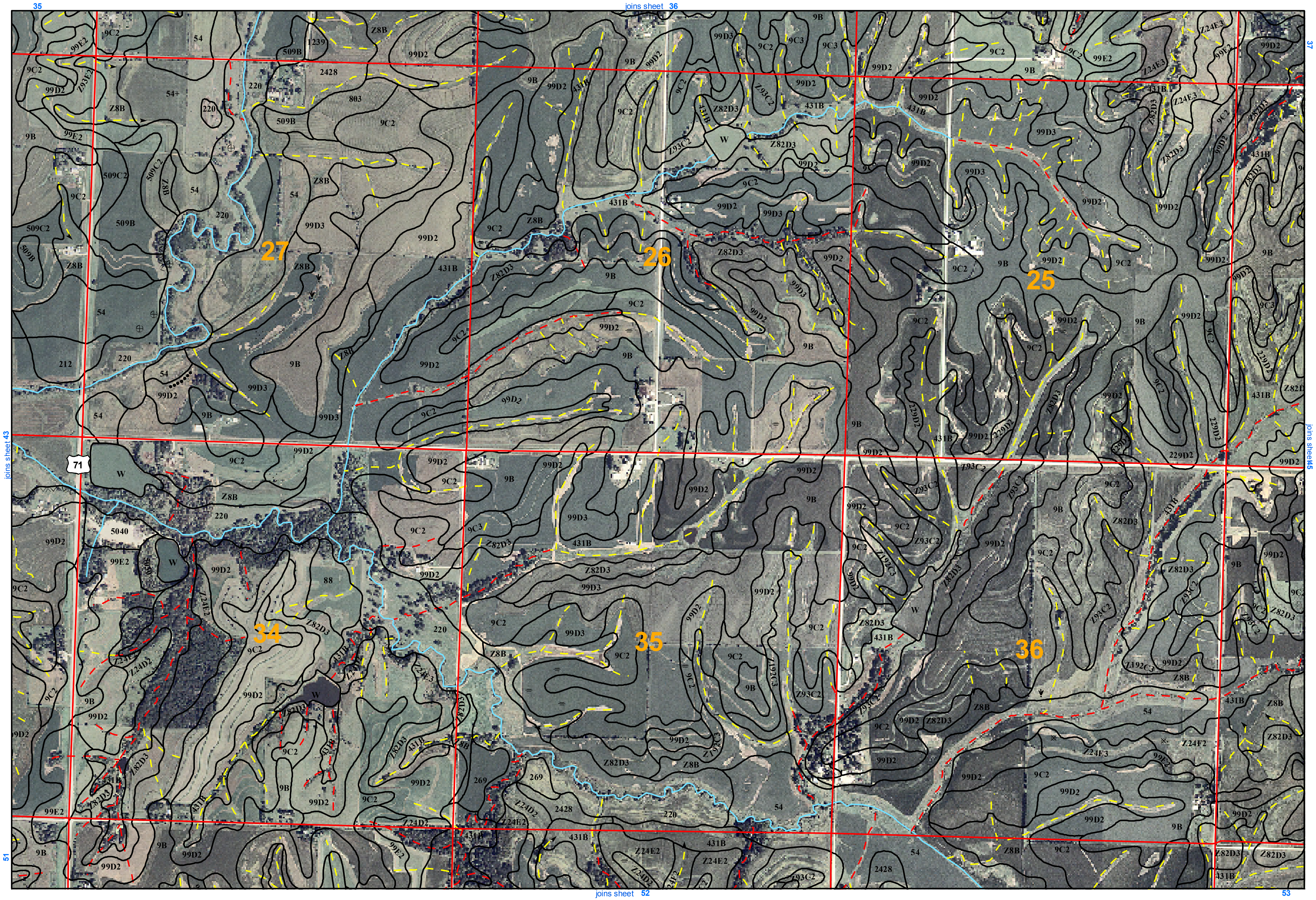

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United States Department of Agriculture
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Township 76N Range 35W

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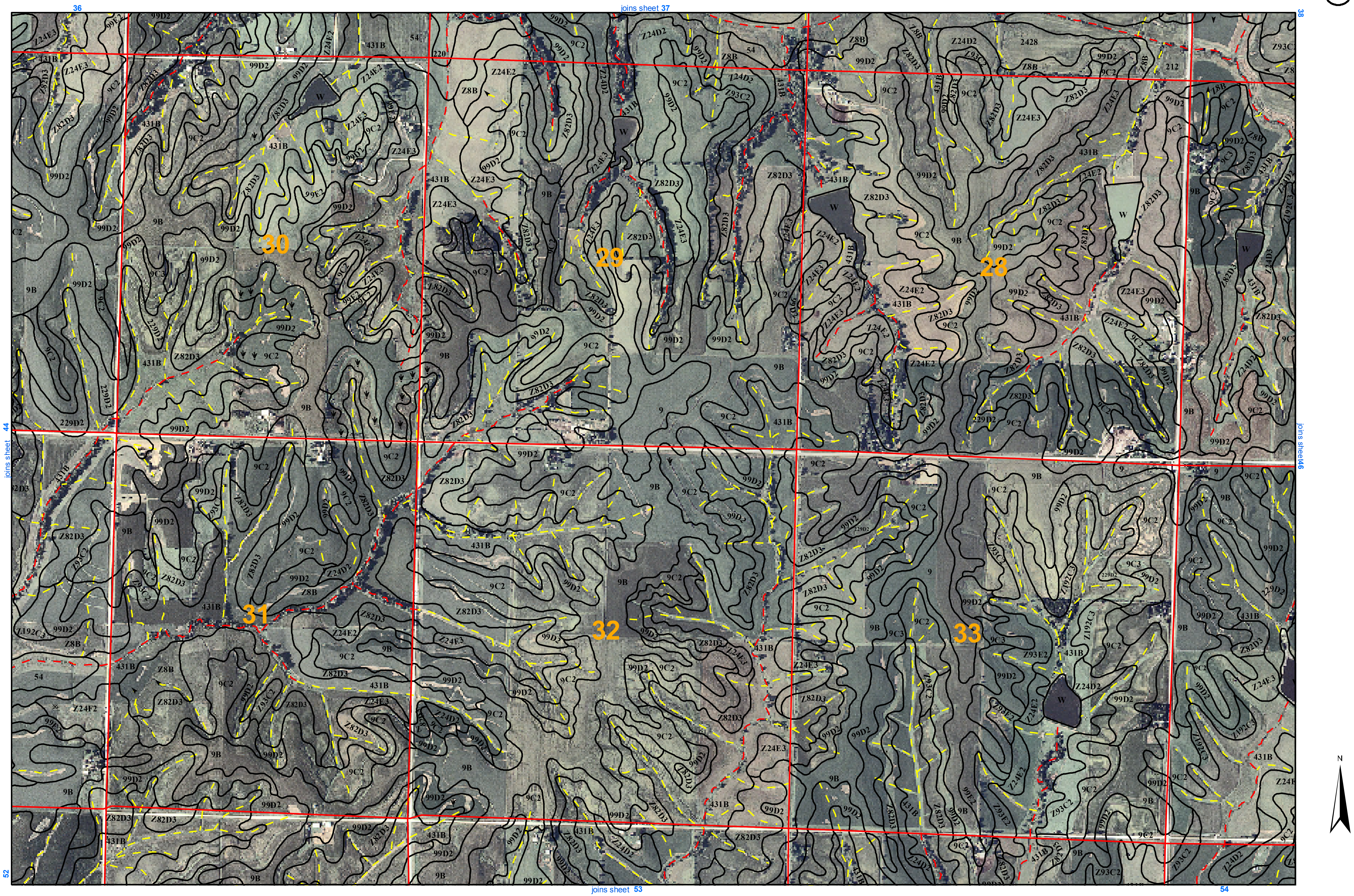

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United States Department of Agriculture
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Township 76N Range 35W

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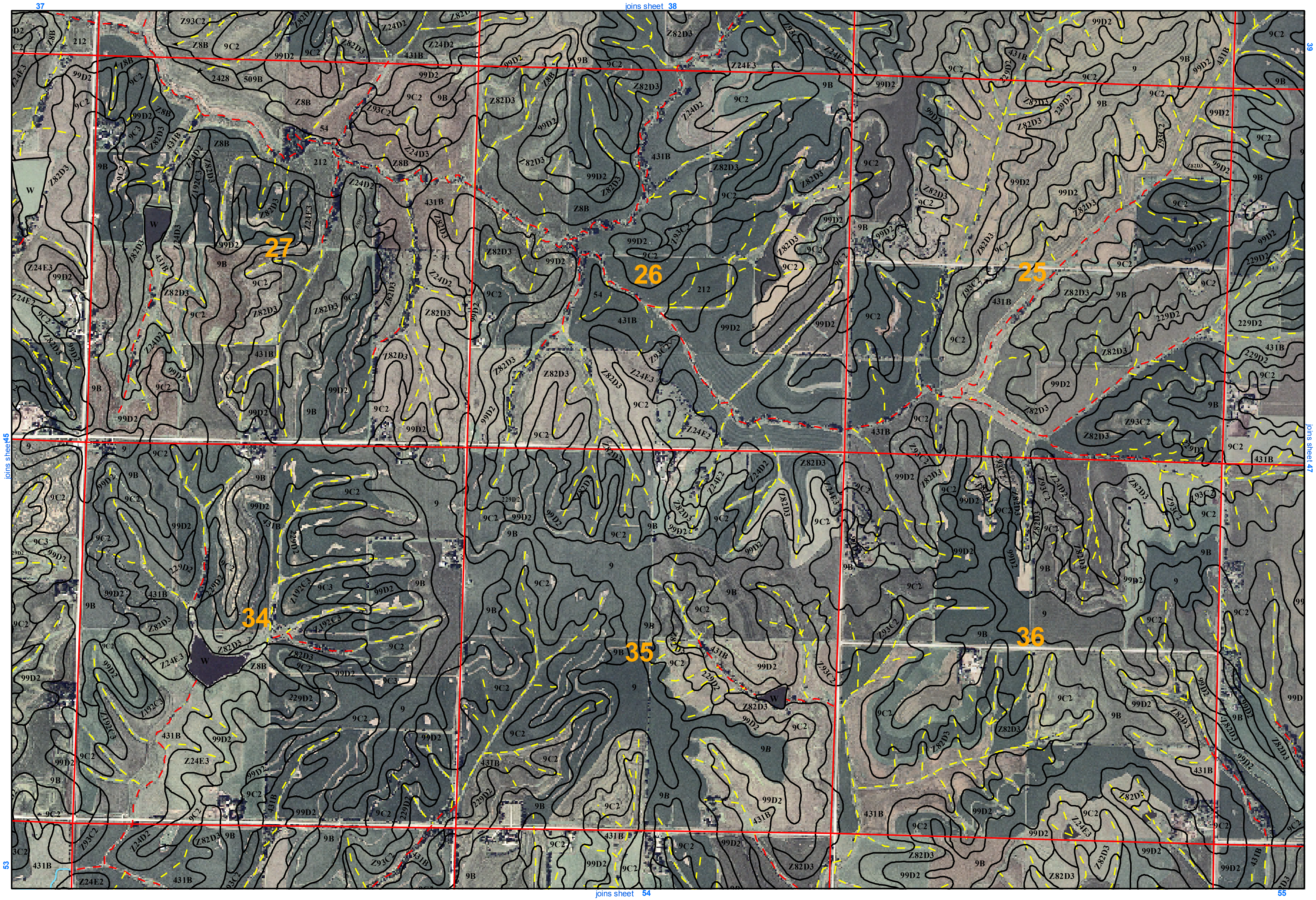

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Township 76N Range 34W

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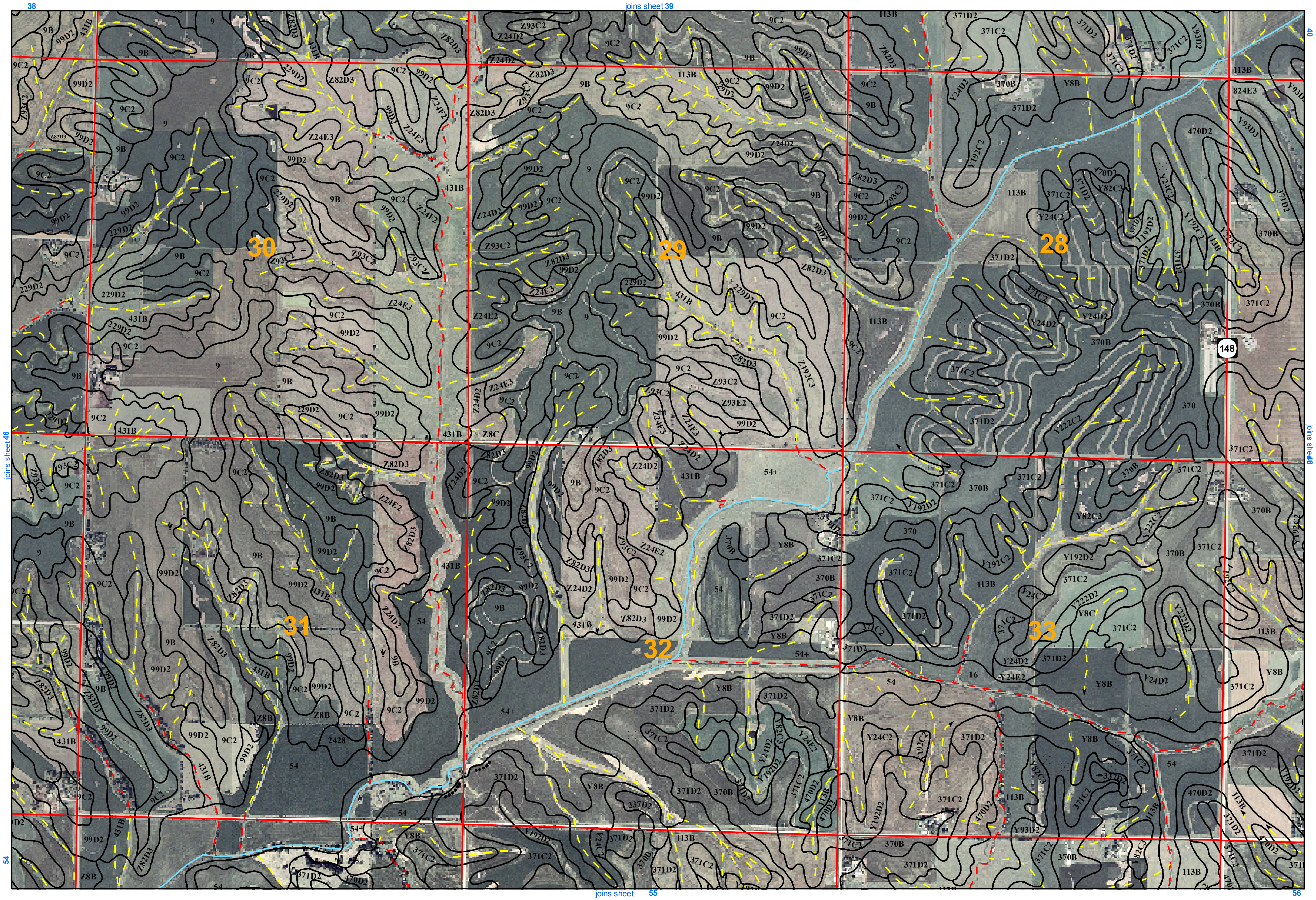

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Township 76N Range 34W

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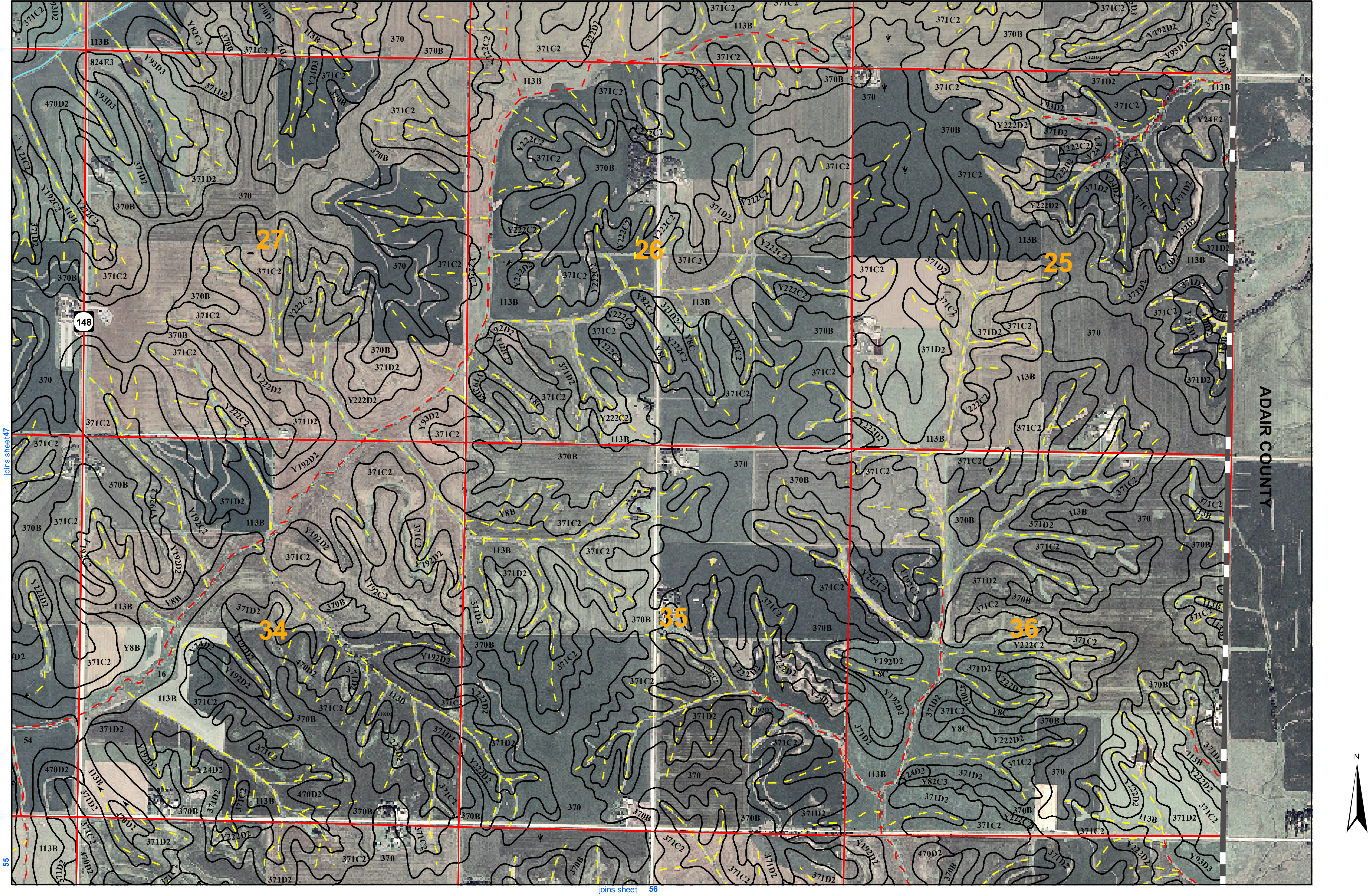
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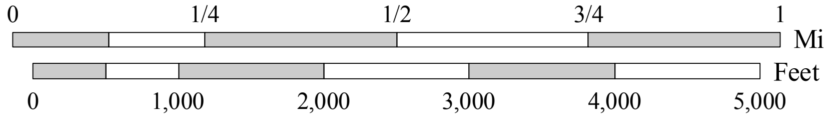
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United States Department of Agriculture
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Township 75N Range 37W

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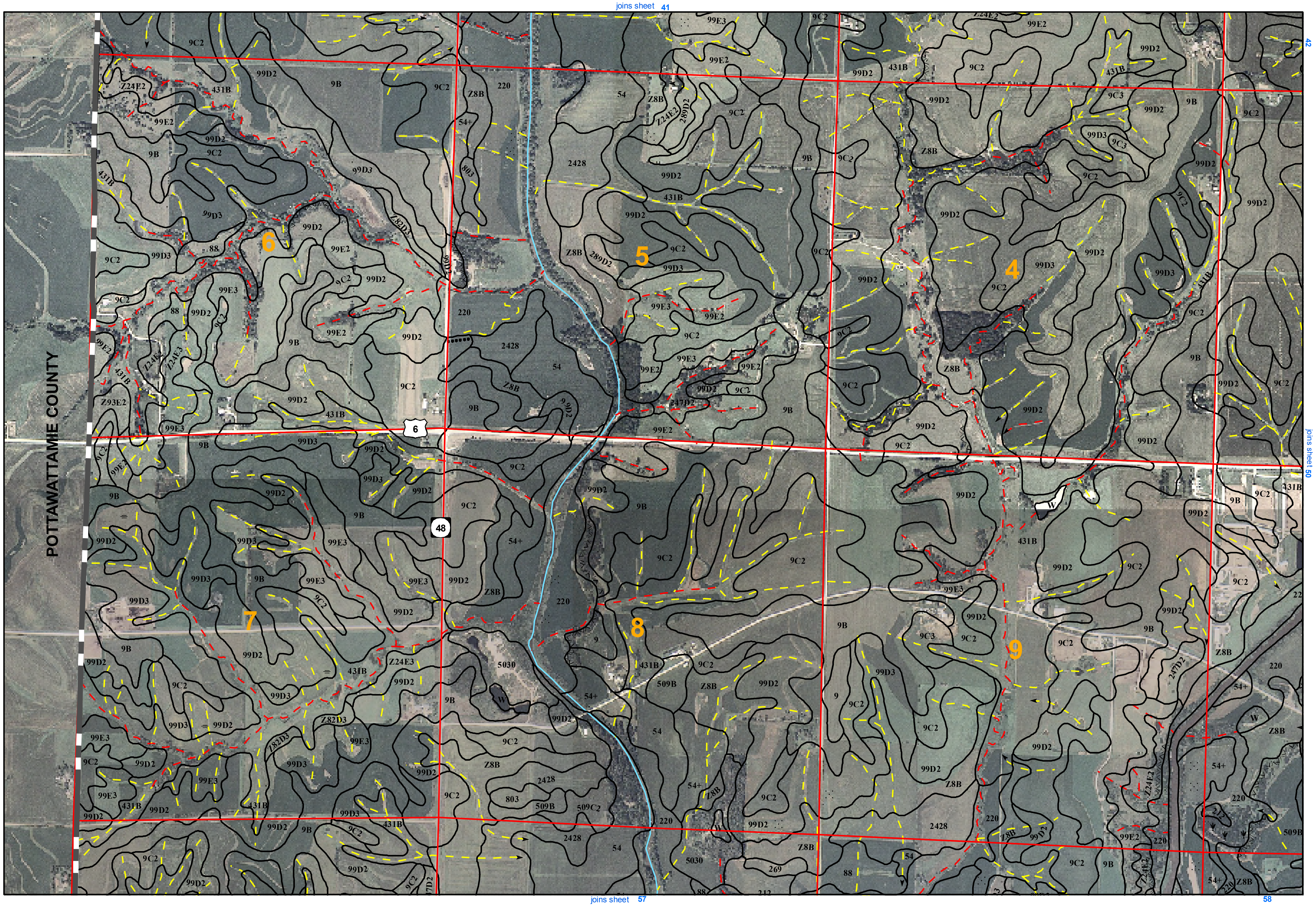

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 75N Range 37W

Soil Survey of Cass County, Iowa

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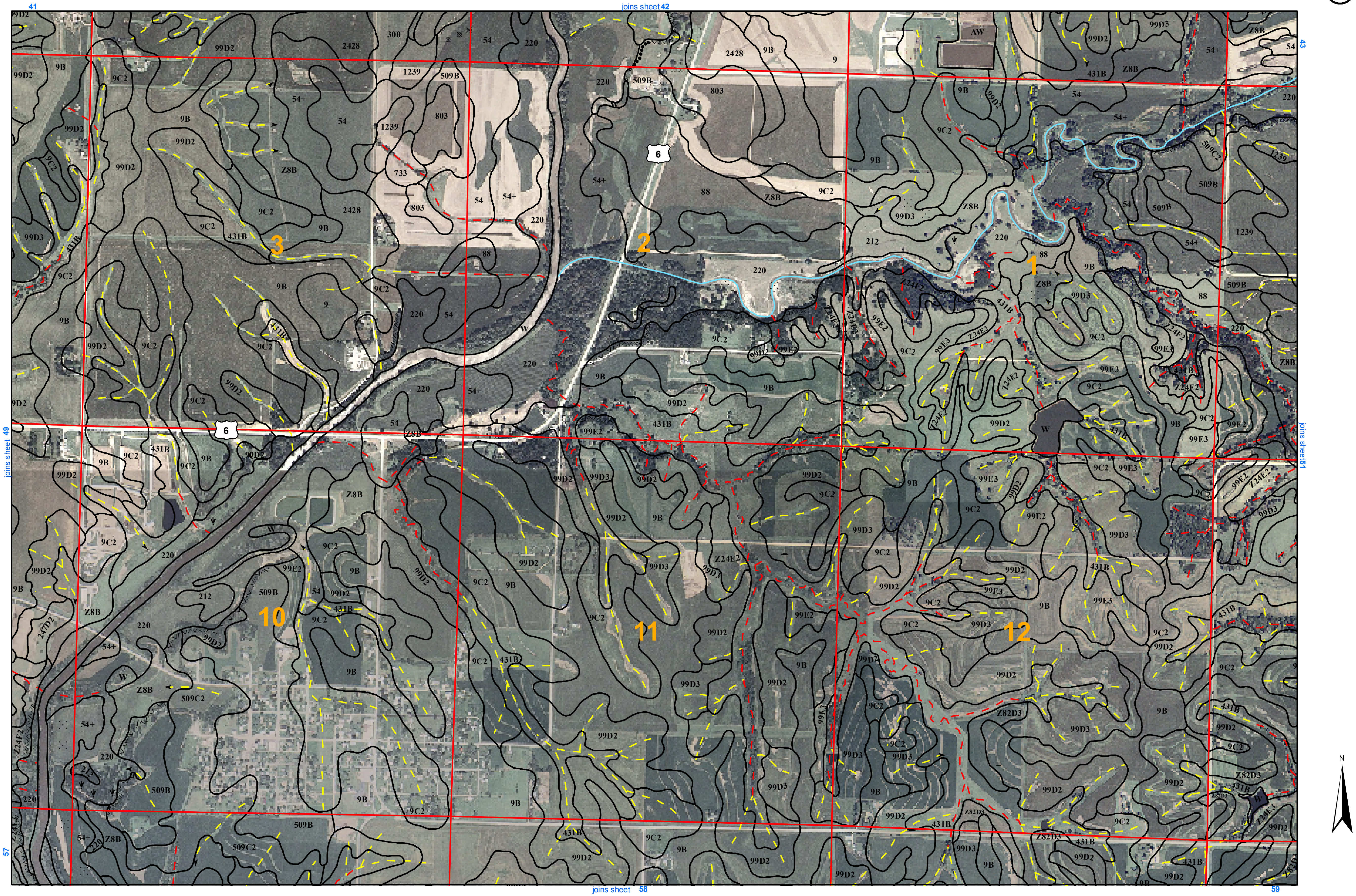
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.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joins sheet 49
joins sheet 51
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1
2
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10
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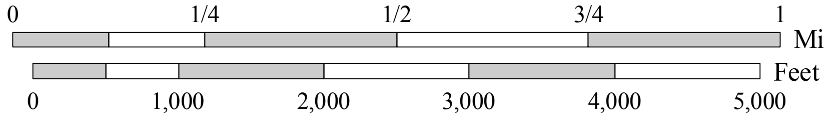
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United States Department of Agriculture
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Township 75N Range 36W

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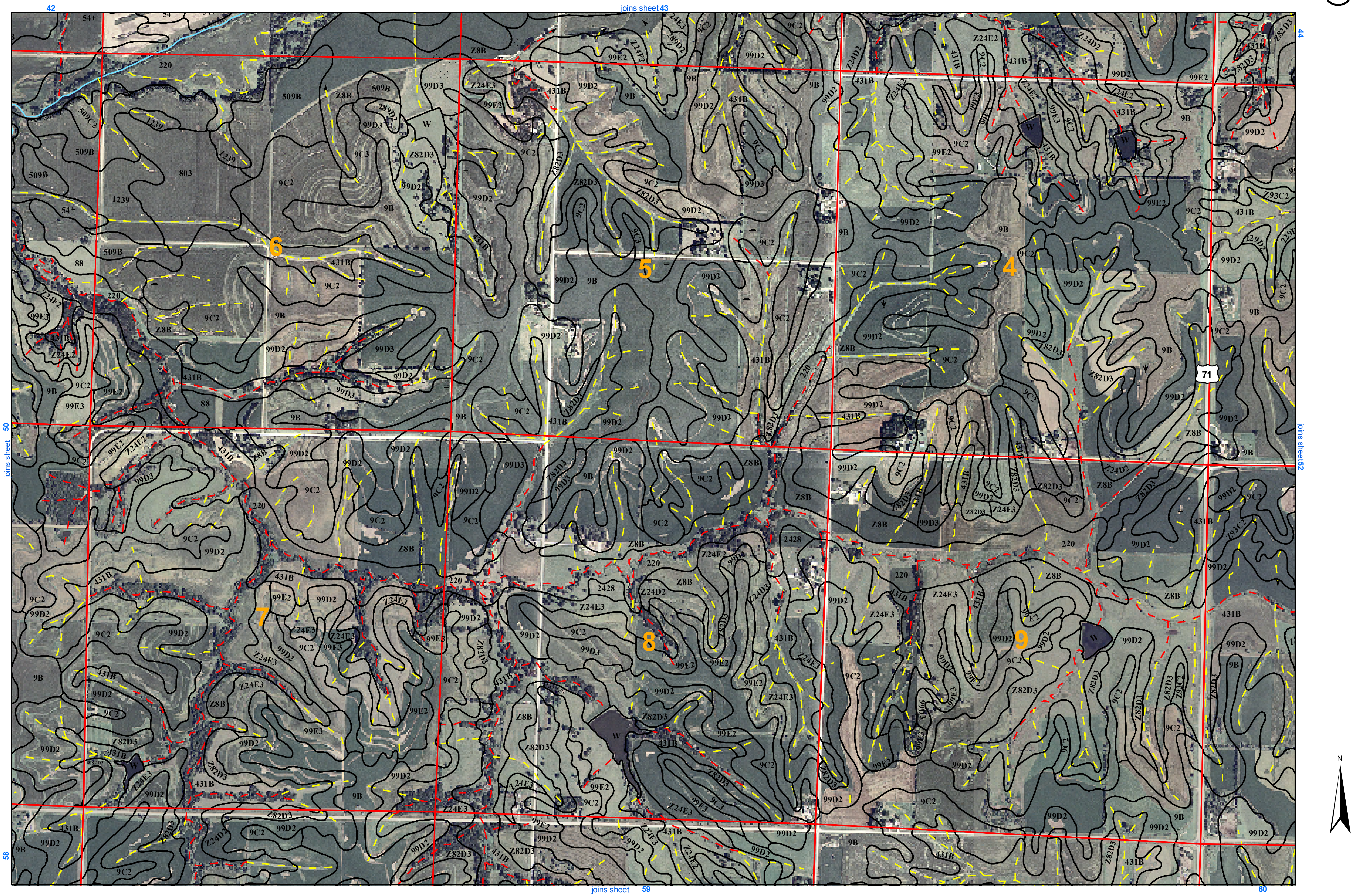
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.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44
50
joins sheet
joins sheet 52
58
joins sheet 59
60
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5
4
7
8
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71
N
509B
220
803
1239
54+
88
9C2
9B
99D2
99D3
99E2
99E3
431B
Z8B
Z24E2
Z24E3
Z24D2
Z82D3
Z93C2
2428
W

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 75N Range 36W

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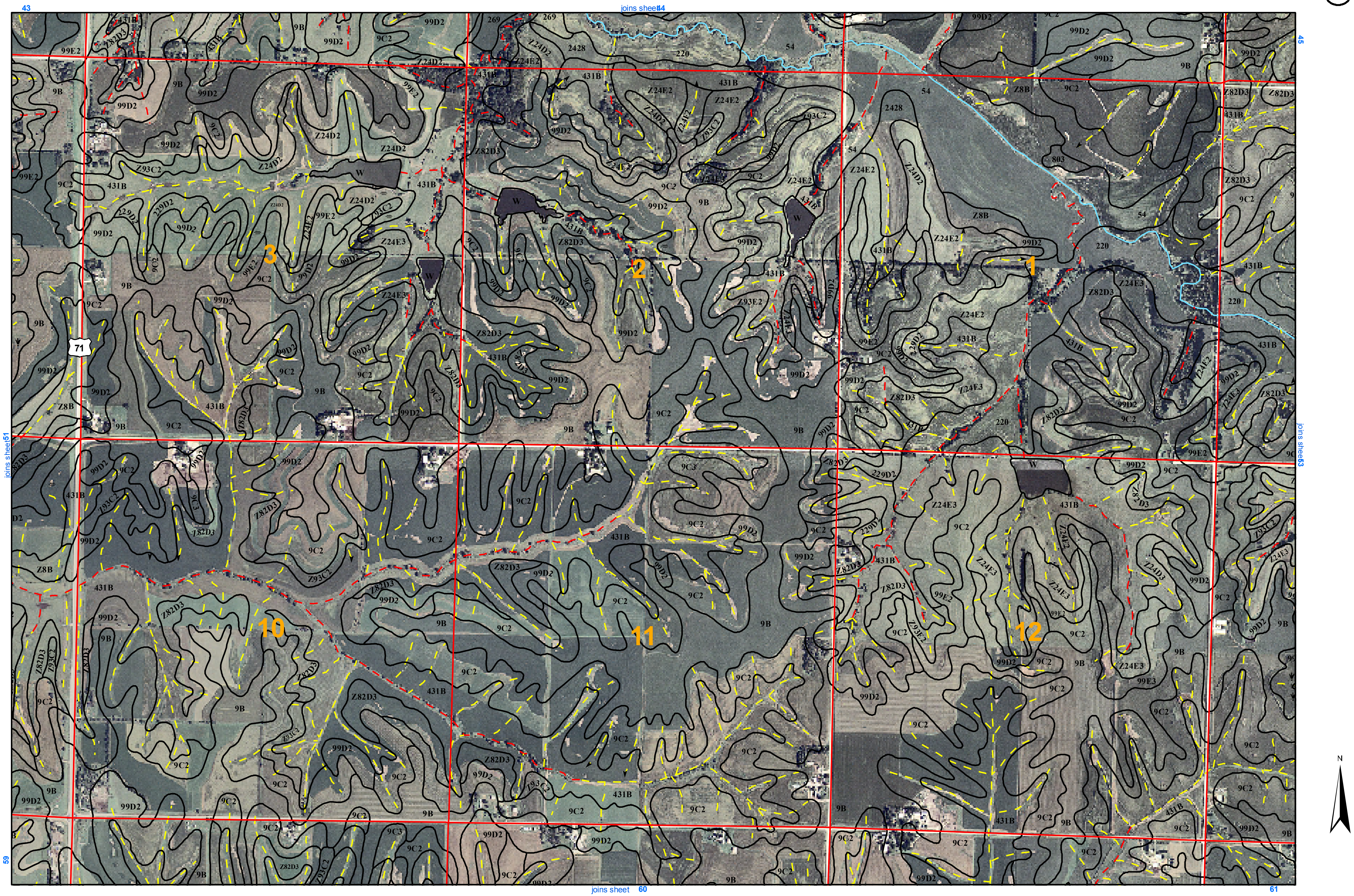
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.


43
joins sheet 44
45
joins sheet 51
joins sheet 53
59
joins sheet 60
61
1
2
3
10
11
12
71
N
W
9B
9C2
99D2
99E2
431B
54
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Z8B
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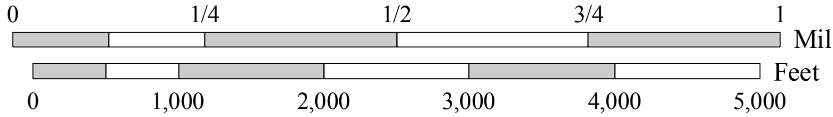
Z24E2
Z24E3
Z82D3
Z93C2
229D2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Township 75N Range 35W

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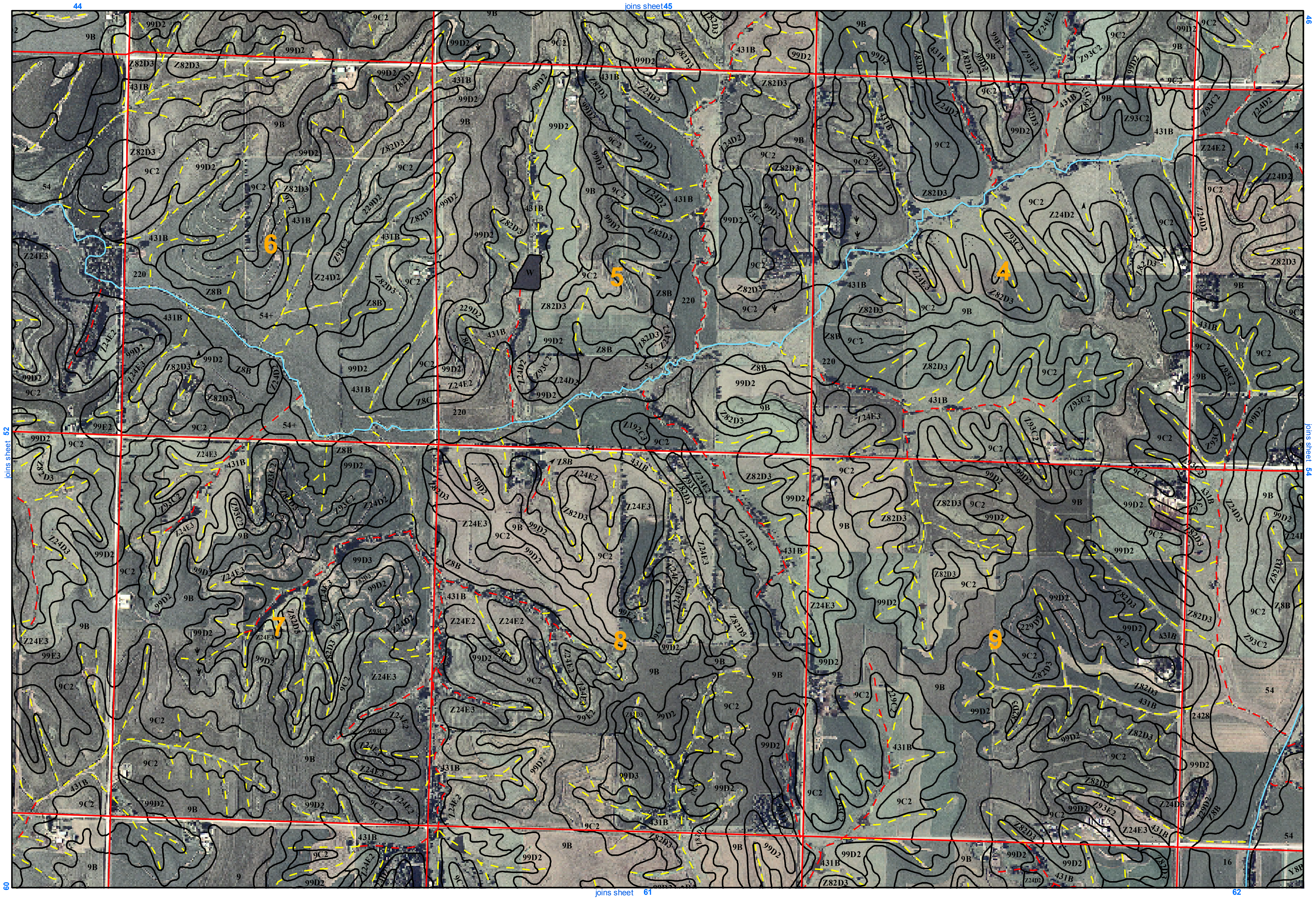
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.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joins sheet 54
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9B
9C2
99D2
99D3
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99E3
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431B
Z24D2
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Z24E3
Z24D3
Z93C2
Z93E2
Z8B
220
229D2
54
54+
16
2428
W

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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Township 75N Range 35W

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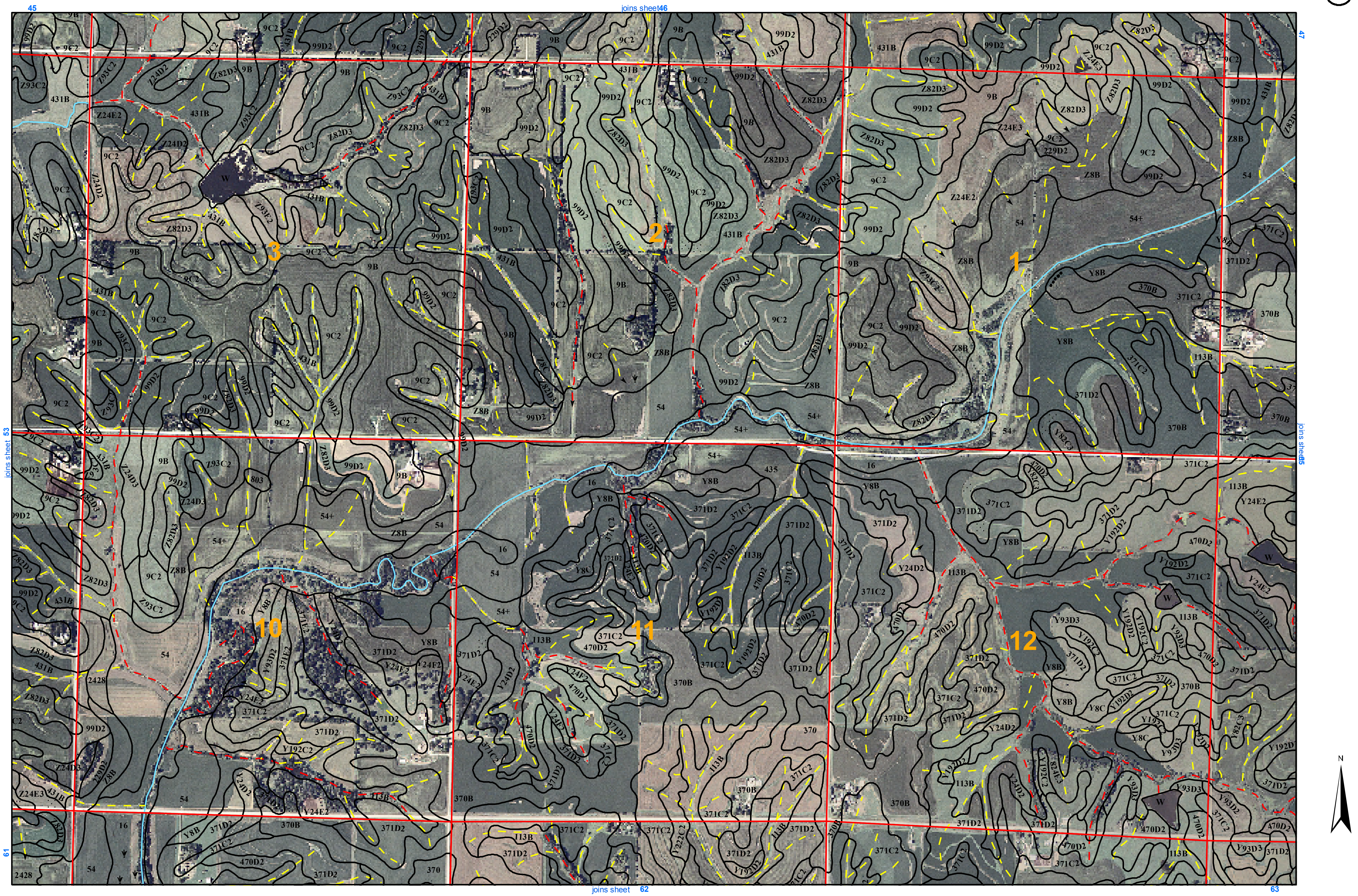
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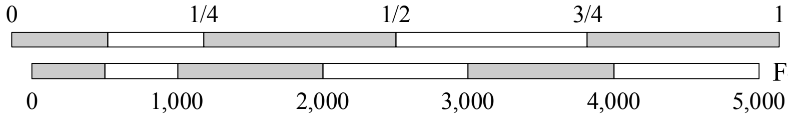
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Township 75N Range 34W

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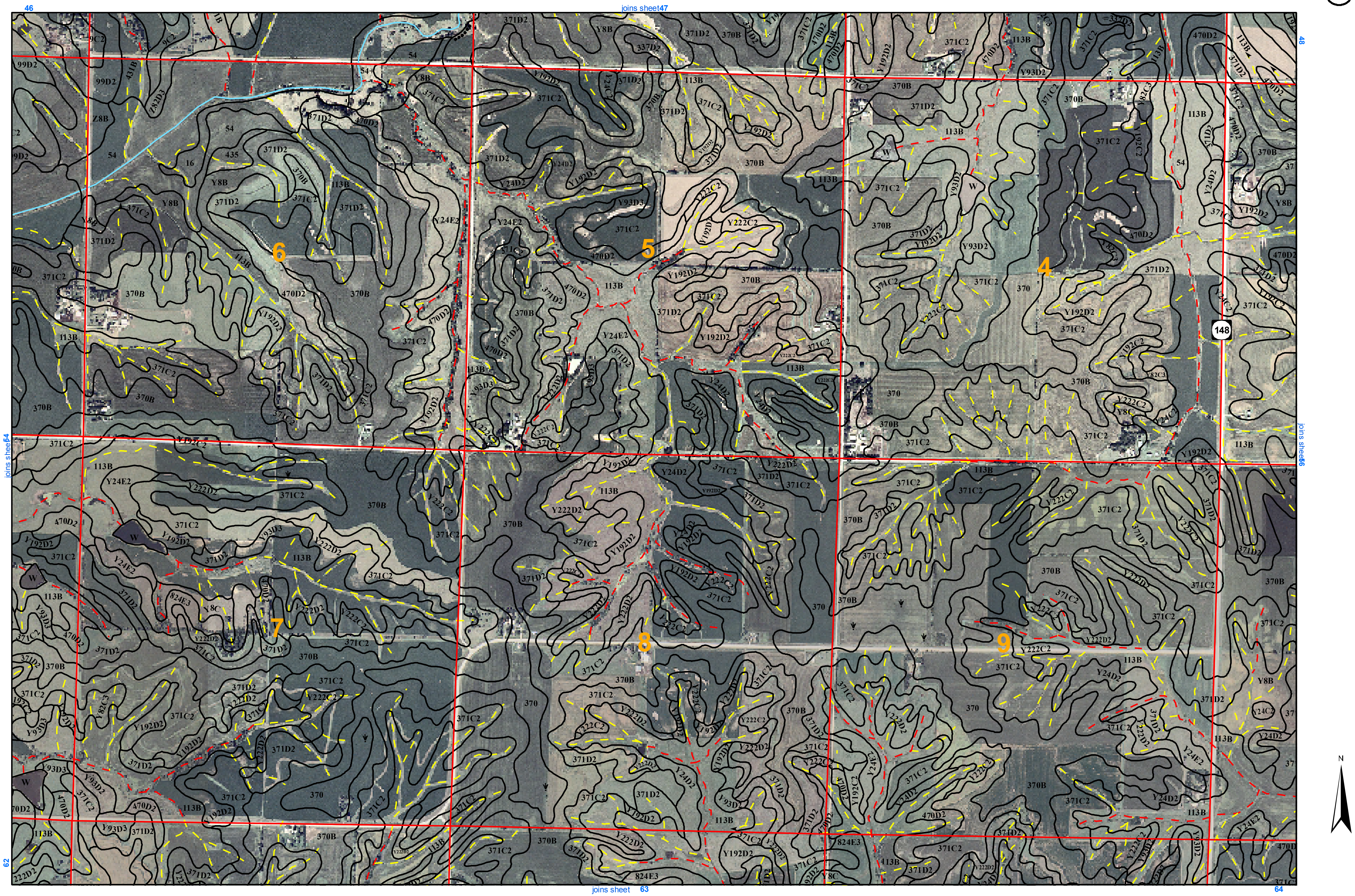
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.


46
joins sheet 47
48
joins sheet 54
joins sheet 56
62
joins sheet 63
64
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7
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N

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Township 75N Range 34W

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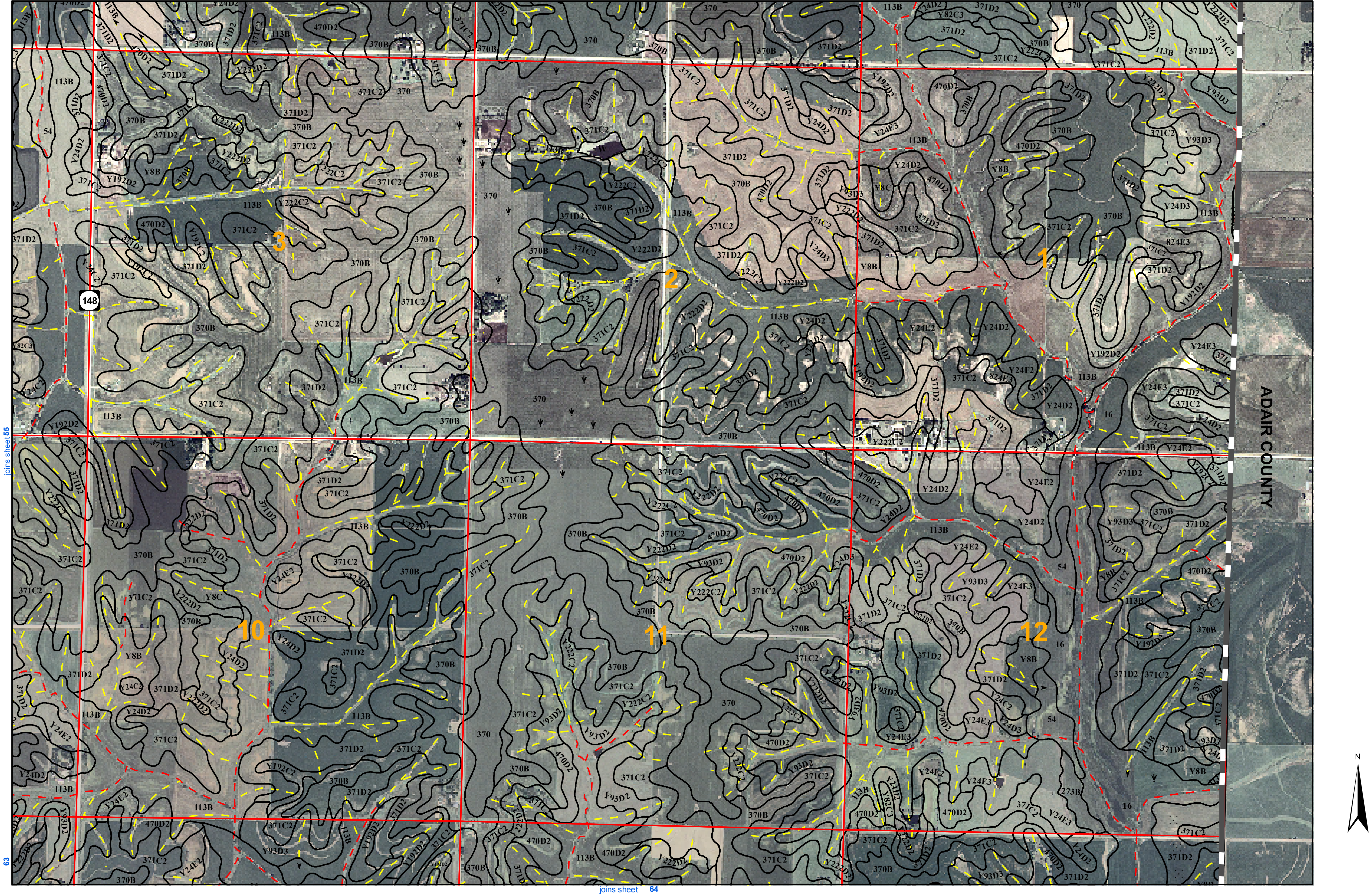
47
joins sheet 48
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63
joins sheet 64
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148
ADAIR COUNTY
N
370
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371C2
371D2
113B
470D2
Y24D2
Y24E2
Y222C2
Y222D2
Y192D2
Y93D3
Y8B
54
16

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United States Department of Agriculture
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Township 75N Range 37W

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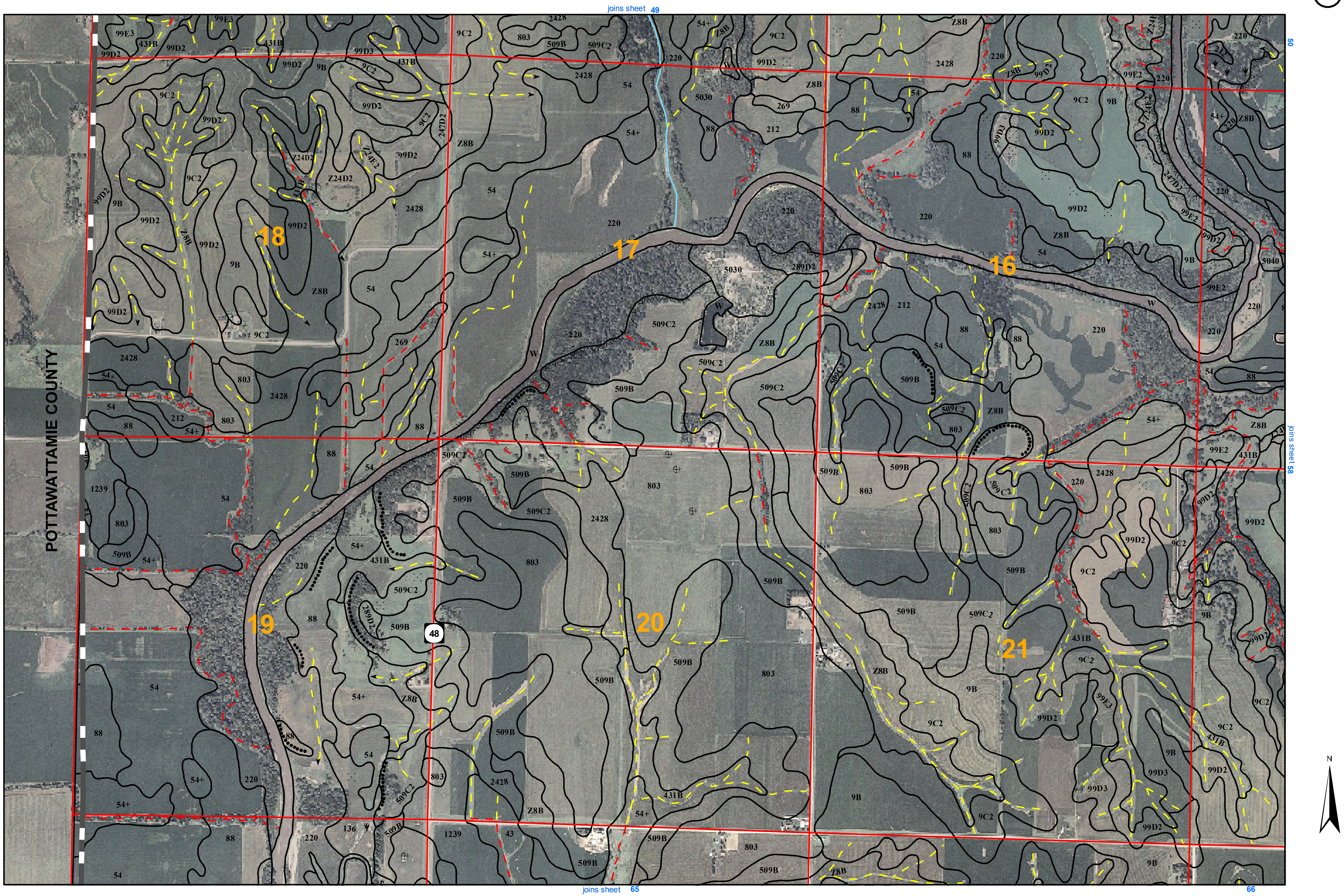
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POTTAWATTAMIE COUNTY
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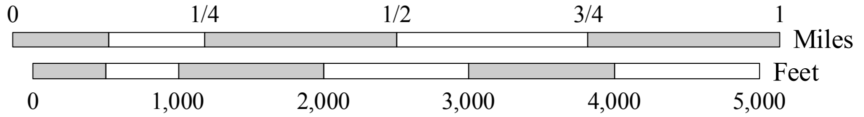
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Township 75N Range 37W

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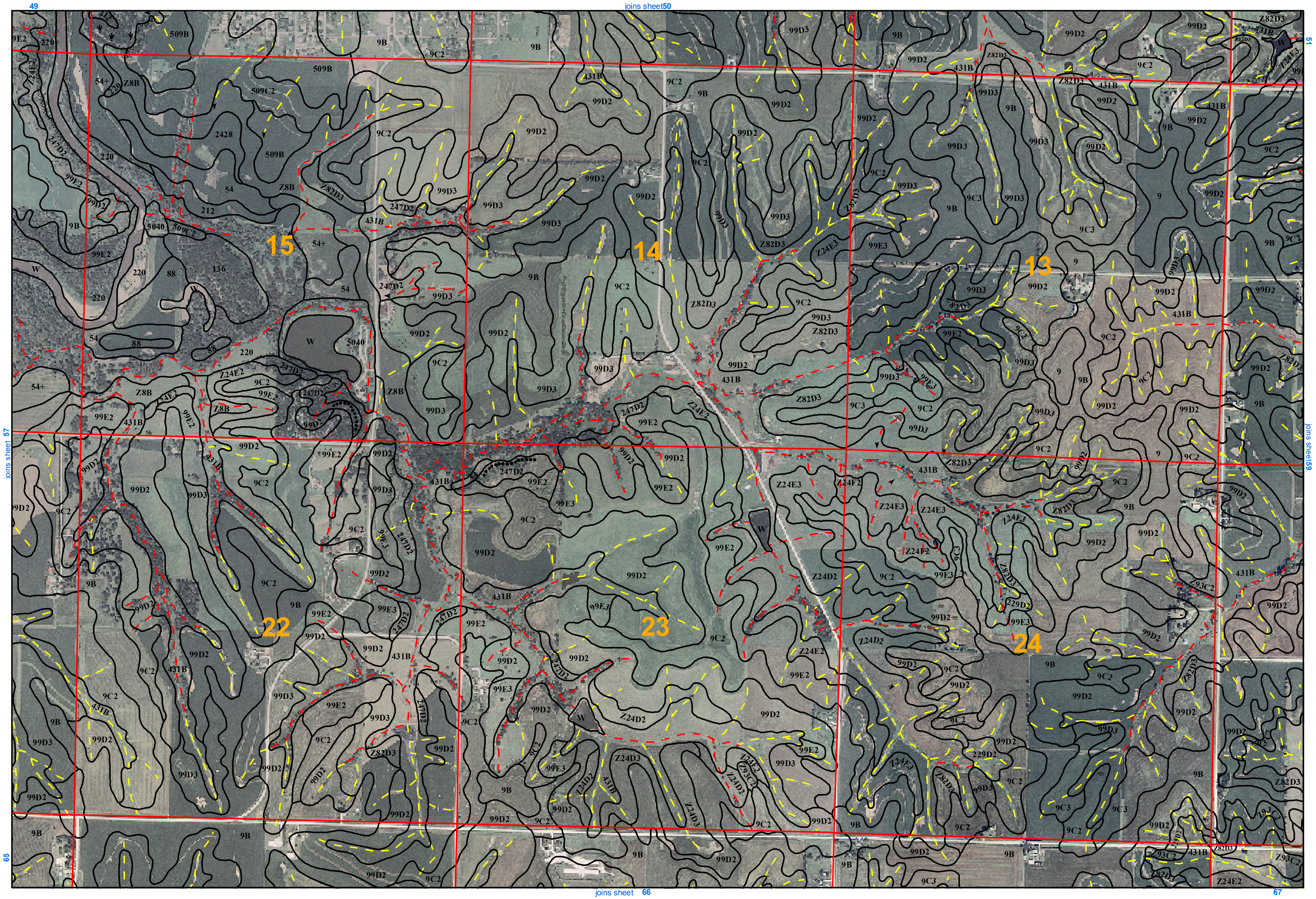
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.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509B
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9C2
99D2
99D3
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99E3
431B
Z82D3
Z24E3
Z24E2
Z24D2
Z24D3
Z24F2
Z93C2
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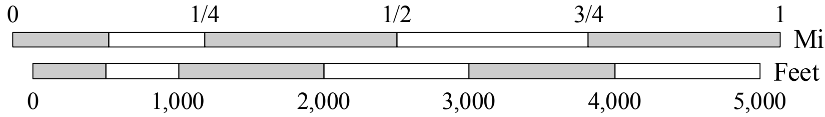
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Township 75N Range 36W

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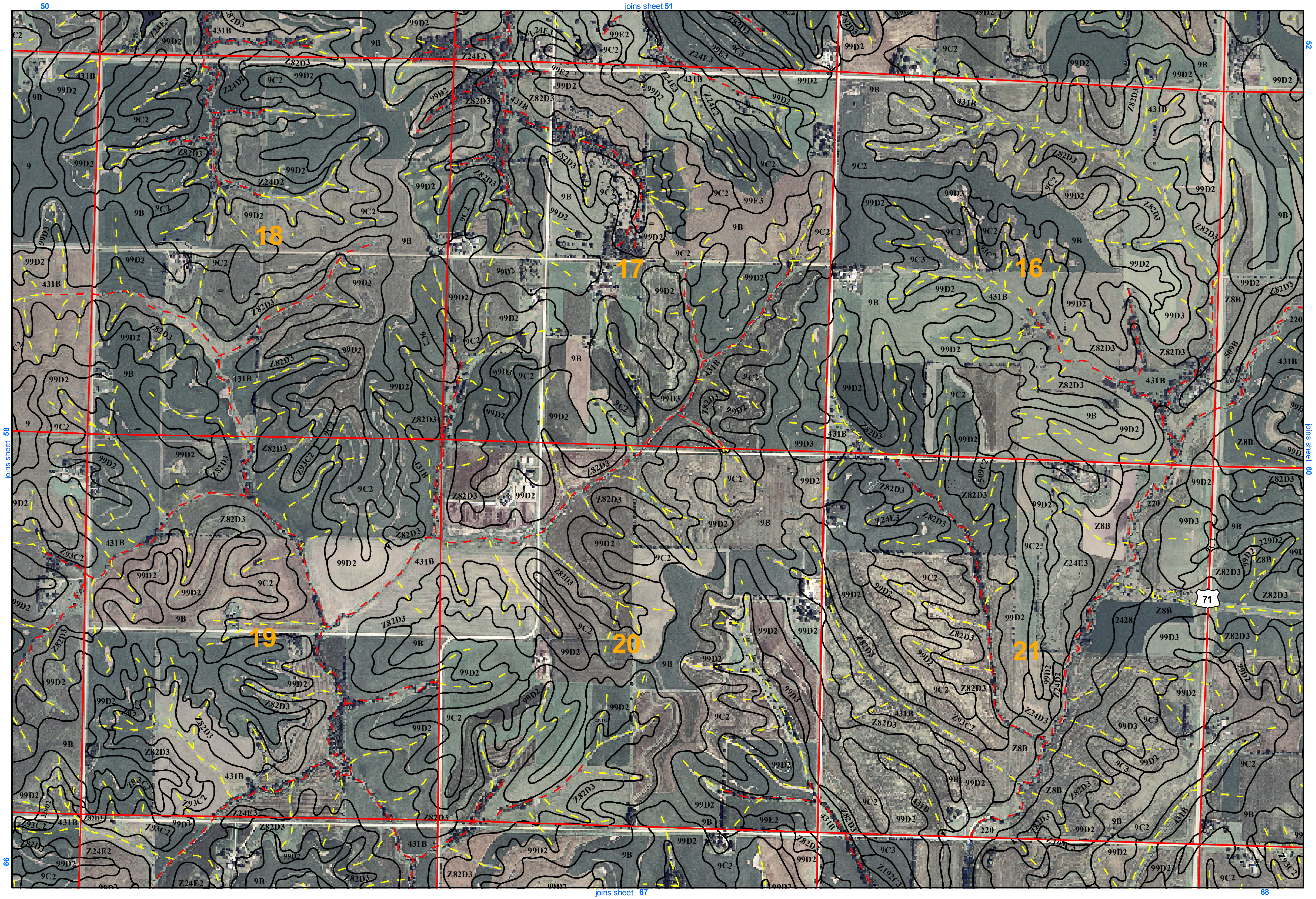
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.



0 1/4 1/2 3/4 1 Miles

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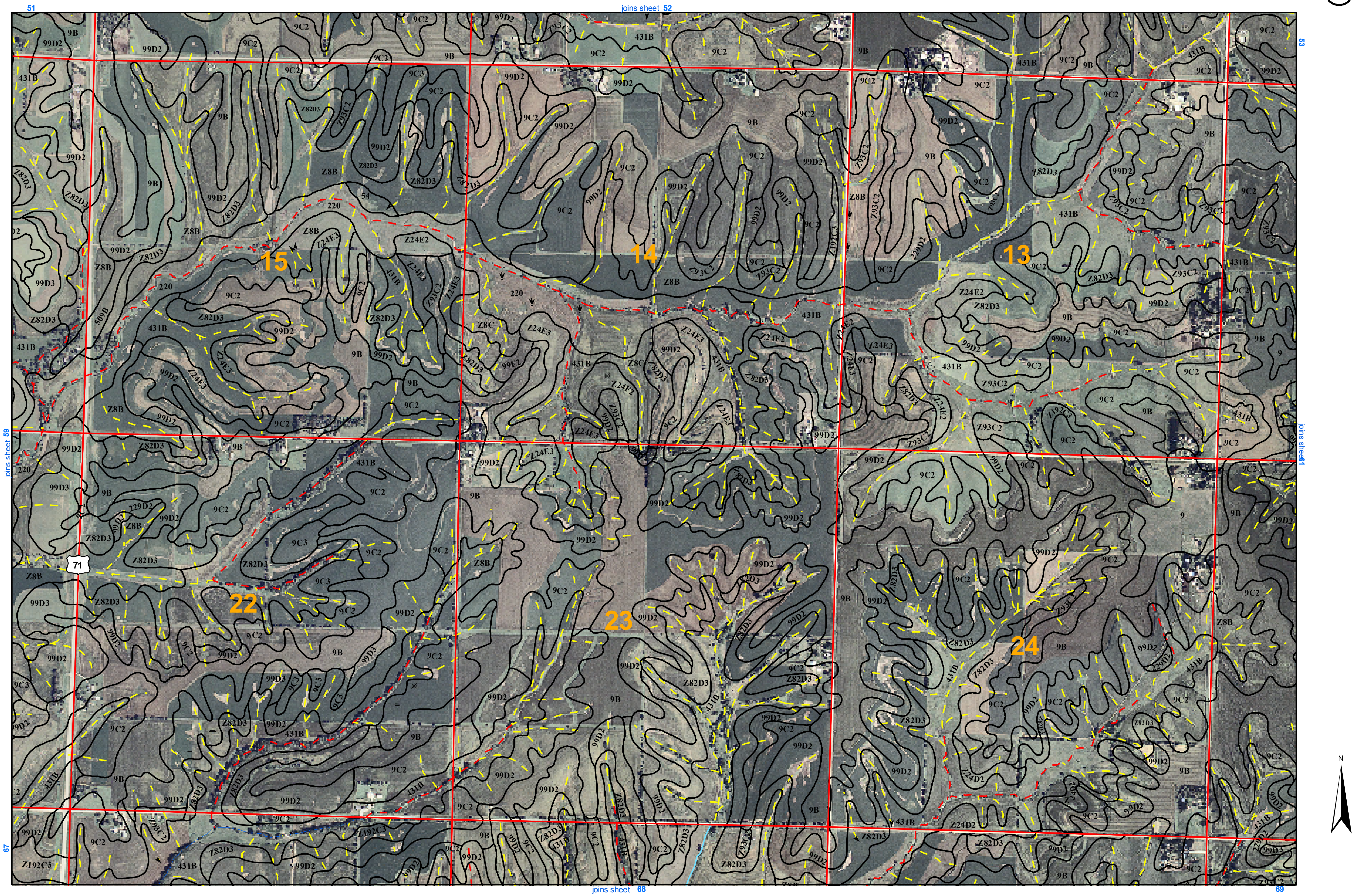
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9B
9C2
9C3
99D2
99D3
99E2
431B
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229D2
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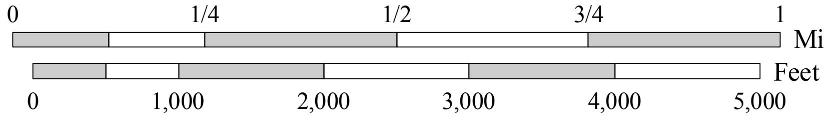
Z93C2
Z192C3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Township 75N Range 35W

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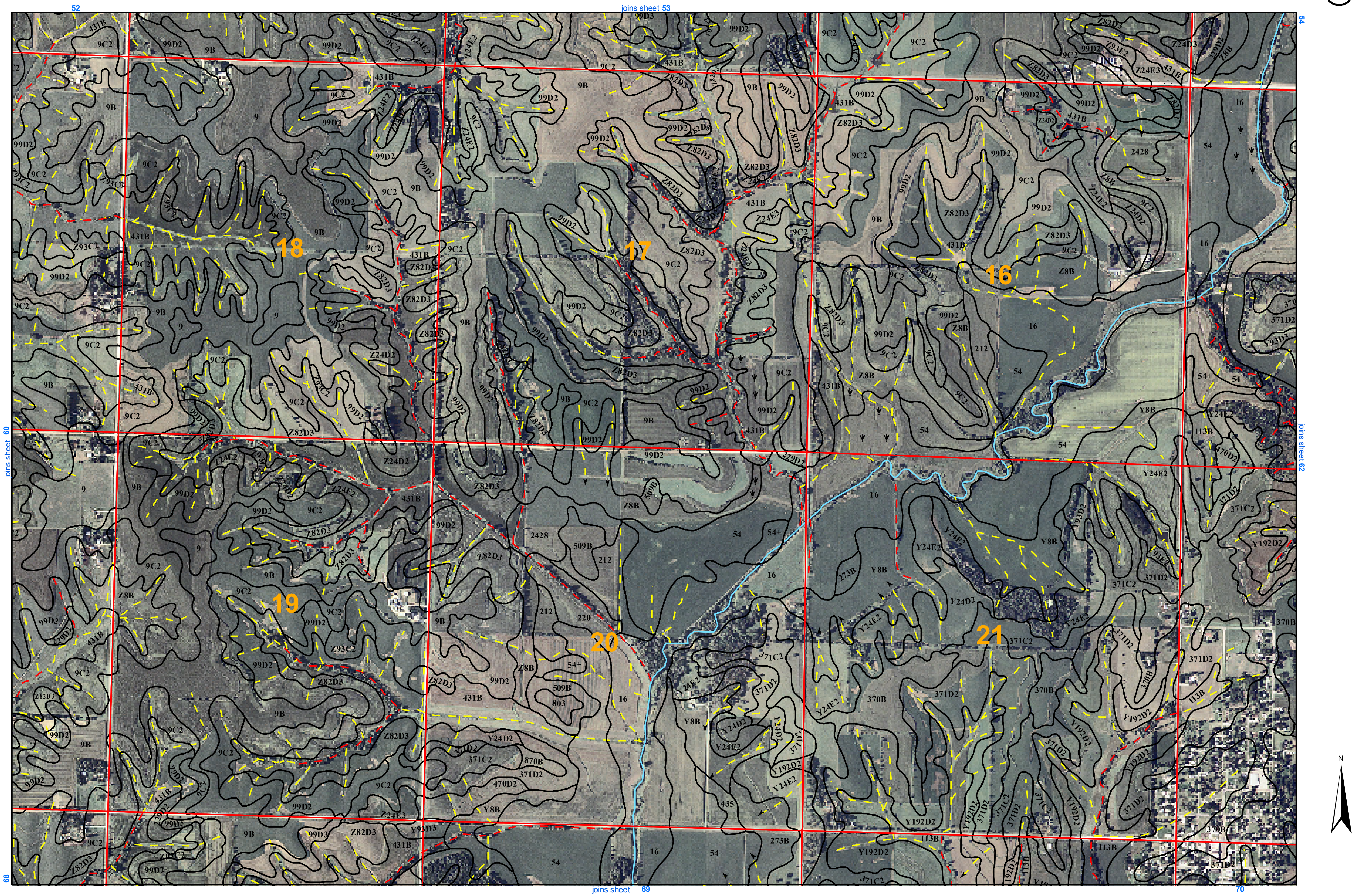
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.



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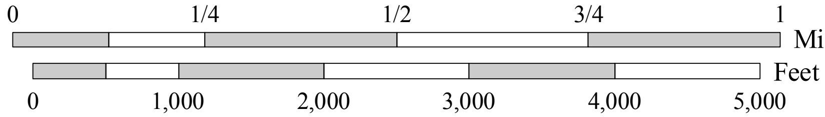

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Township 75N Range 35W

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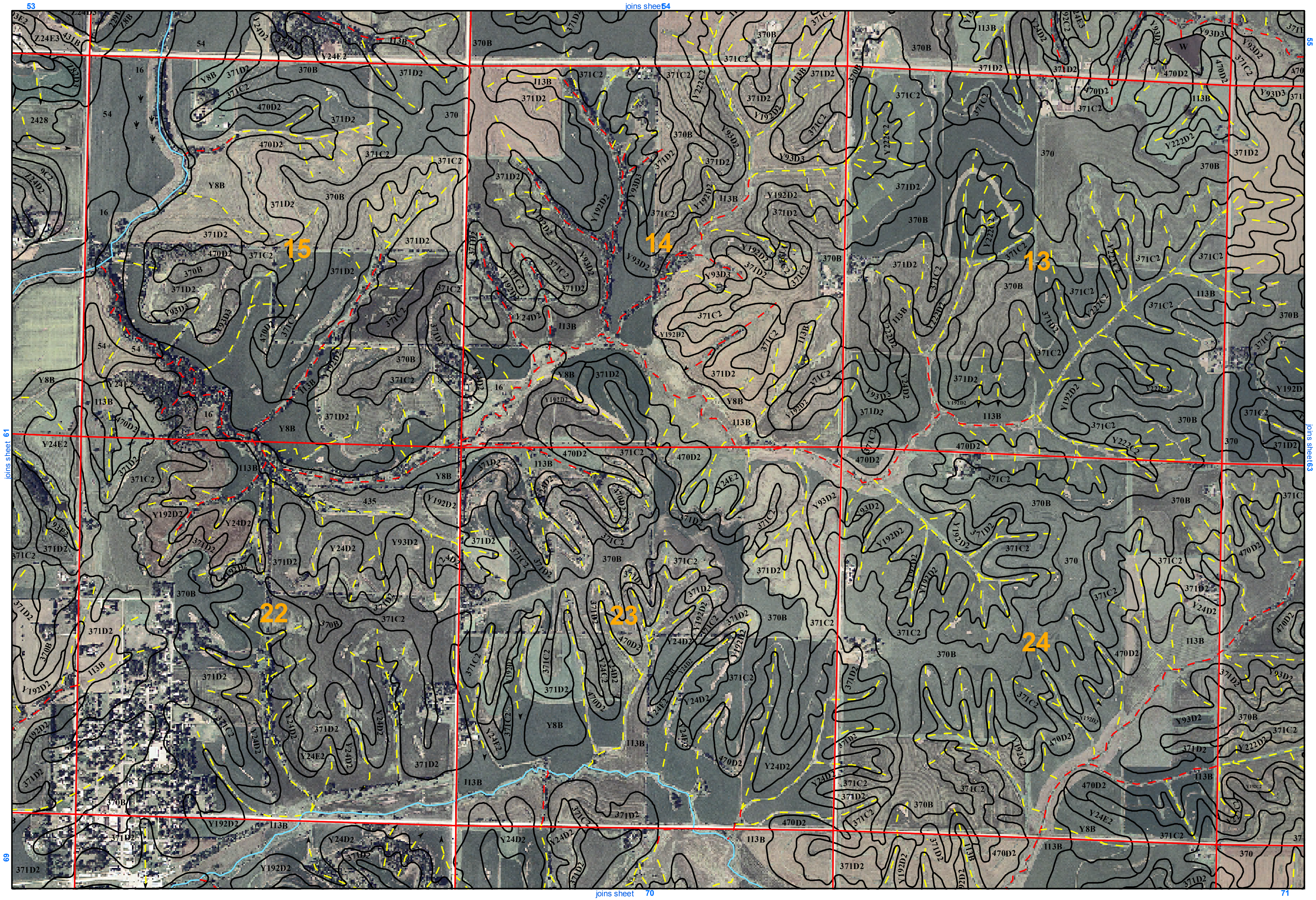
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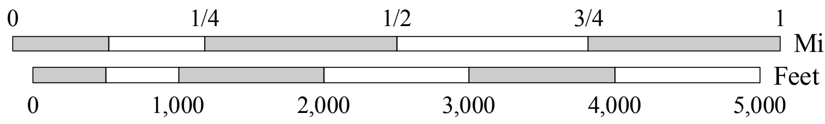
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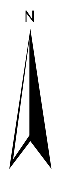

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Township 75N Range 34W

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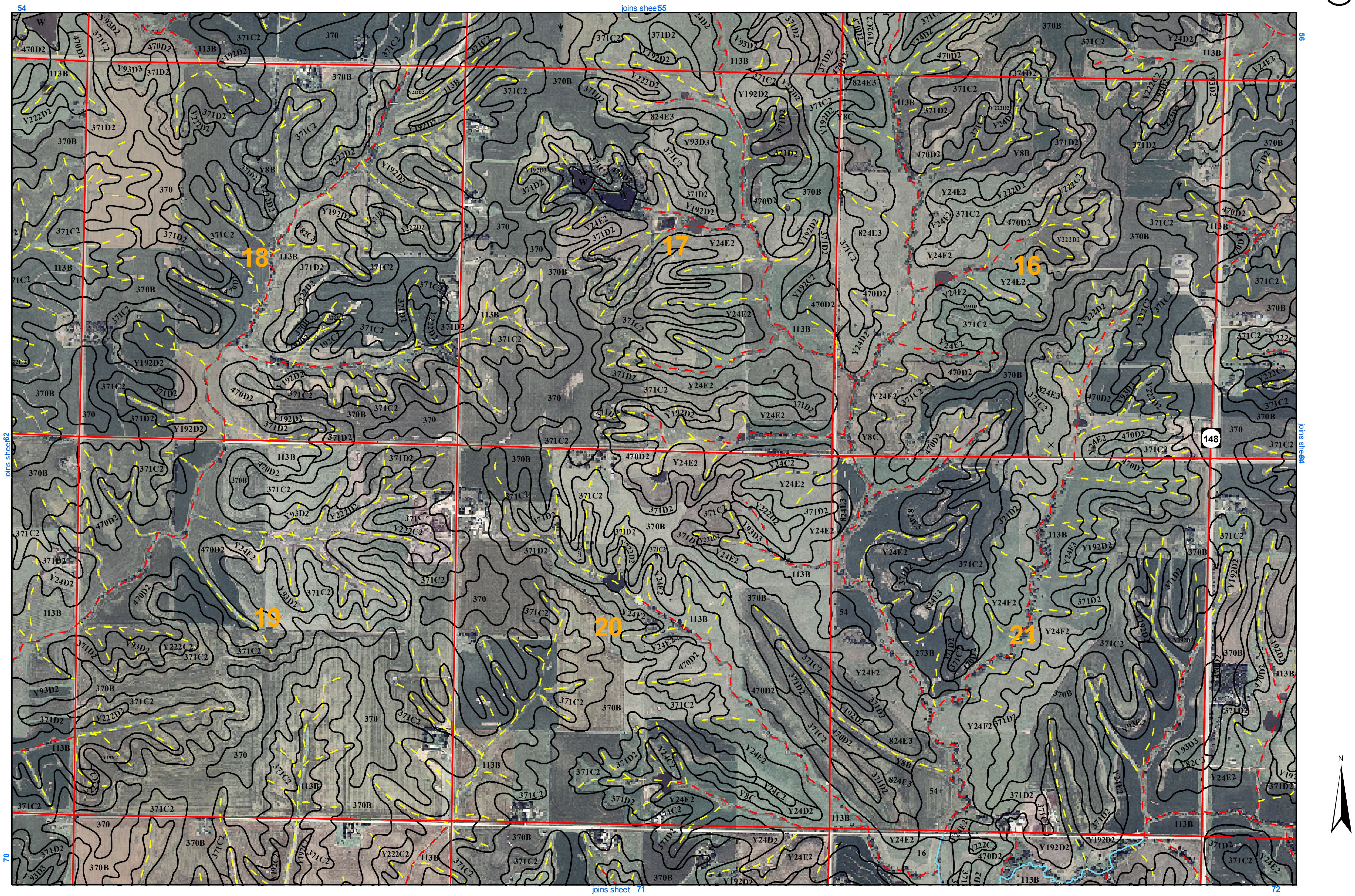
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370B
371C2
371D2
113B
470D2
824E3
Y24E2
Y24F2
Y192D2
Y222D2
Y93D2
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Y8B
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Feet

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Township 75N Range 34W

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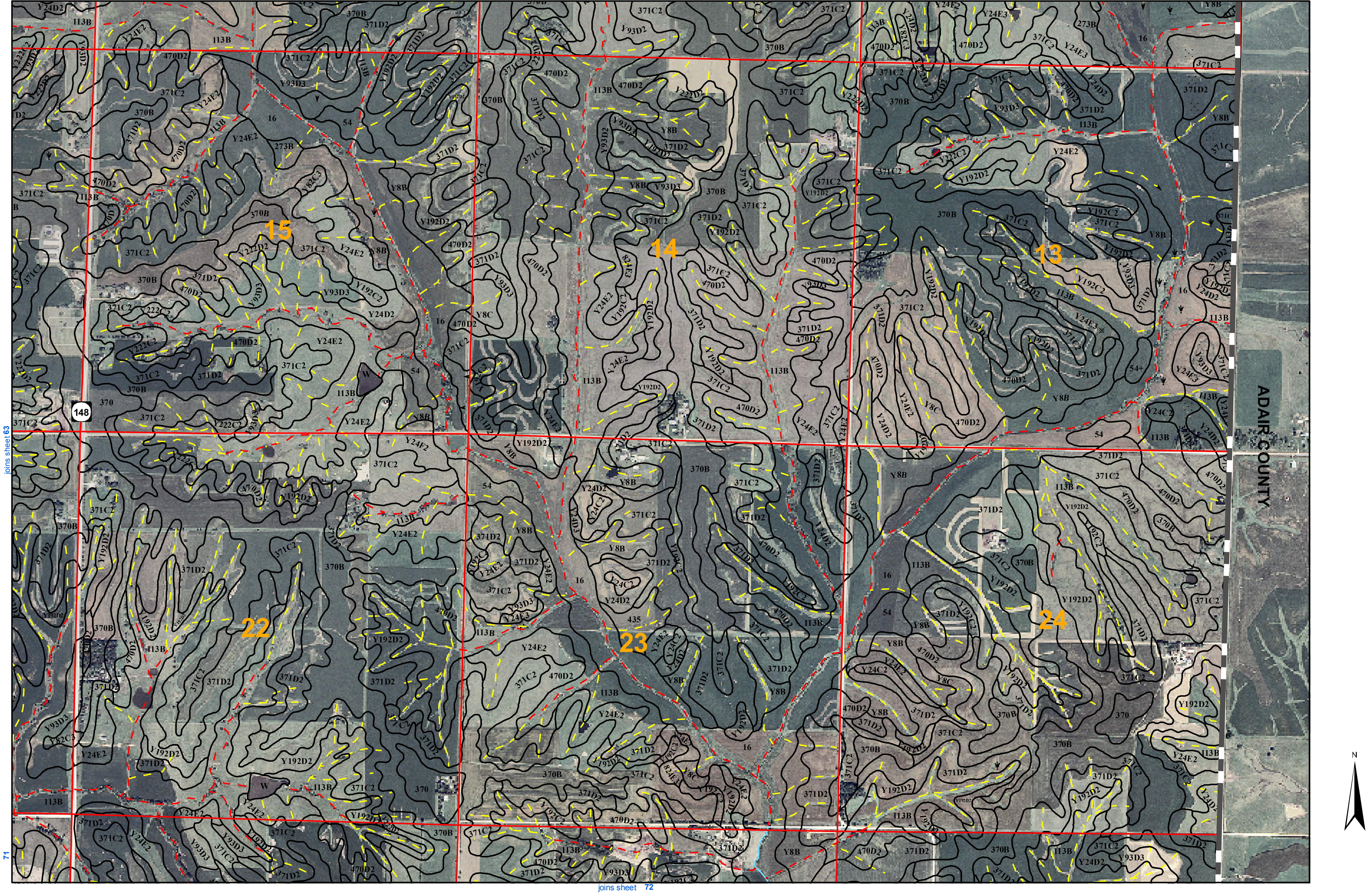

0 1/4 1/2 3/4 1 Miles

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Township 75N Range 37W

Soil Survey of Cass County, Iowa

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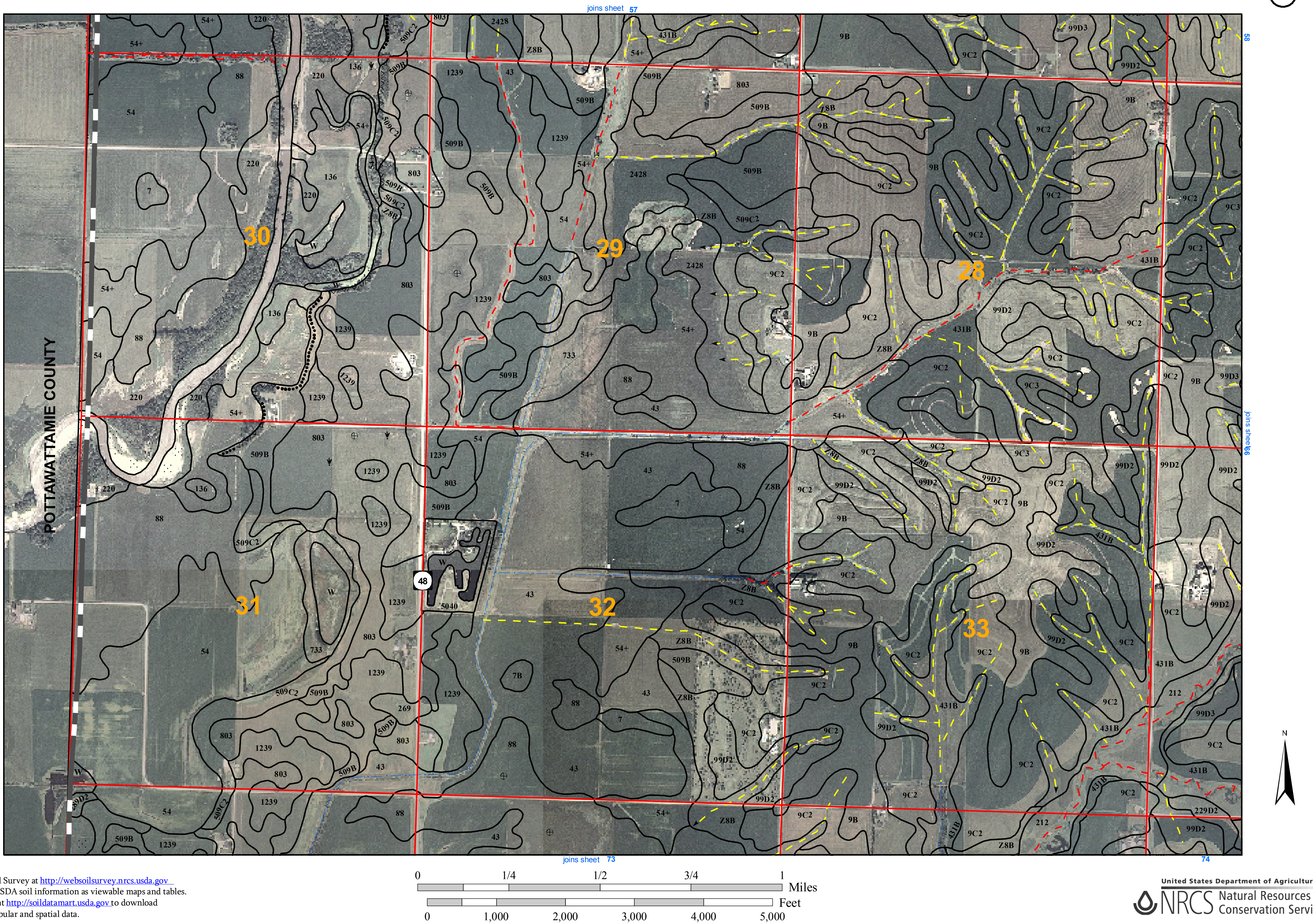
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.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POTTAWATTAMIE COUNTY
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Township 75N Range 37W

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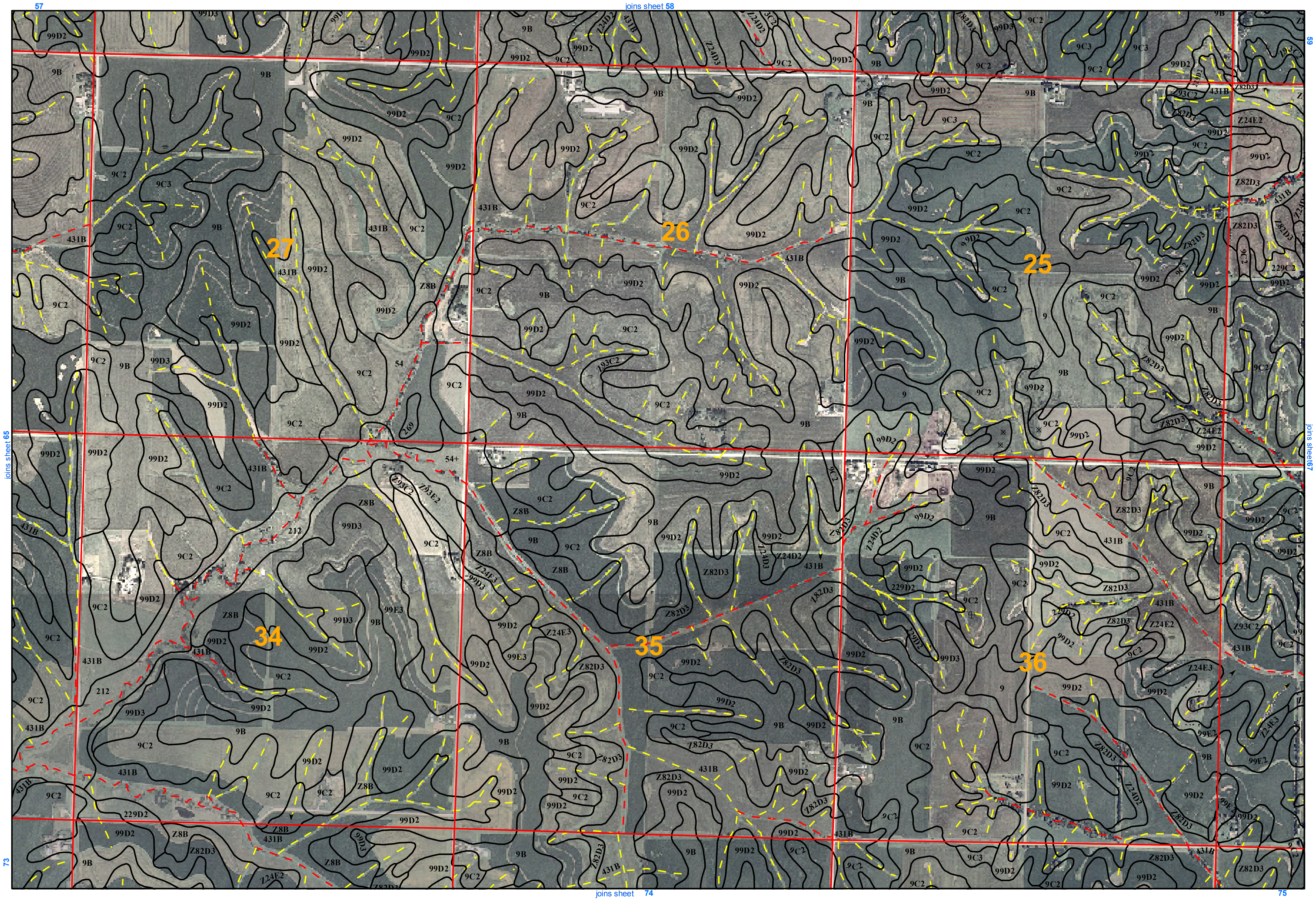
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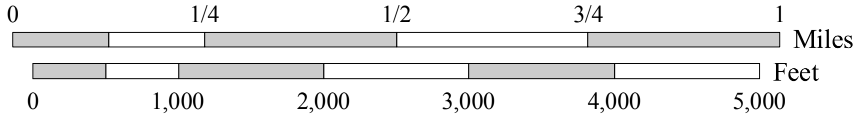
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Township 75N Range 36W

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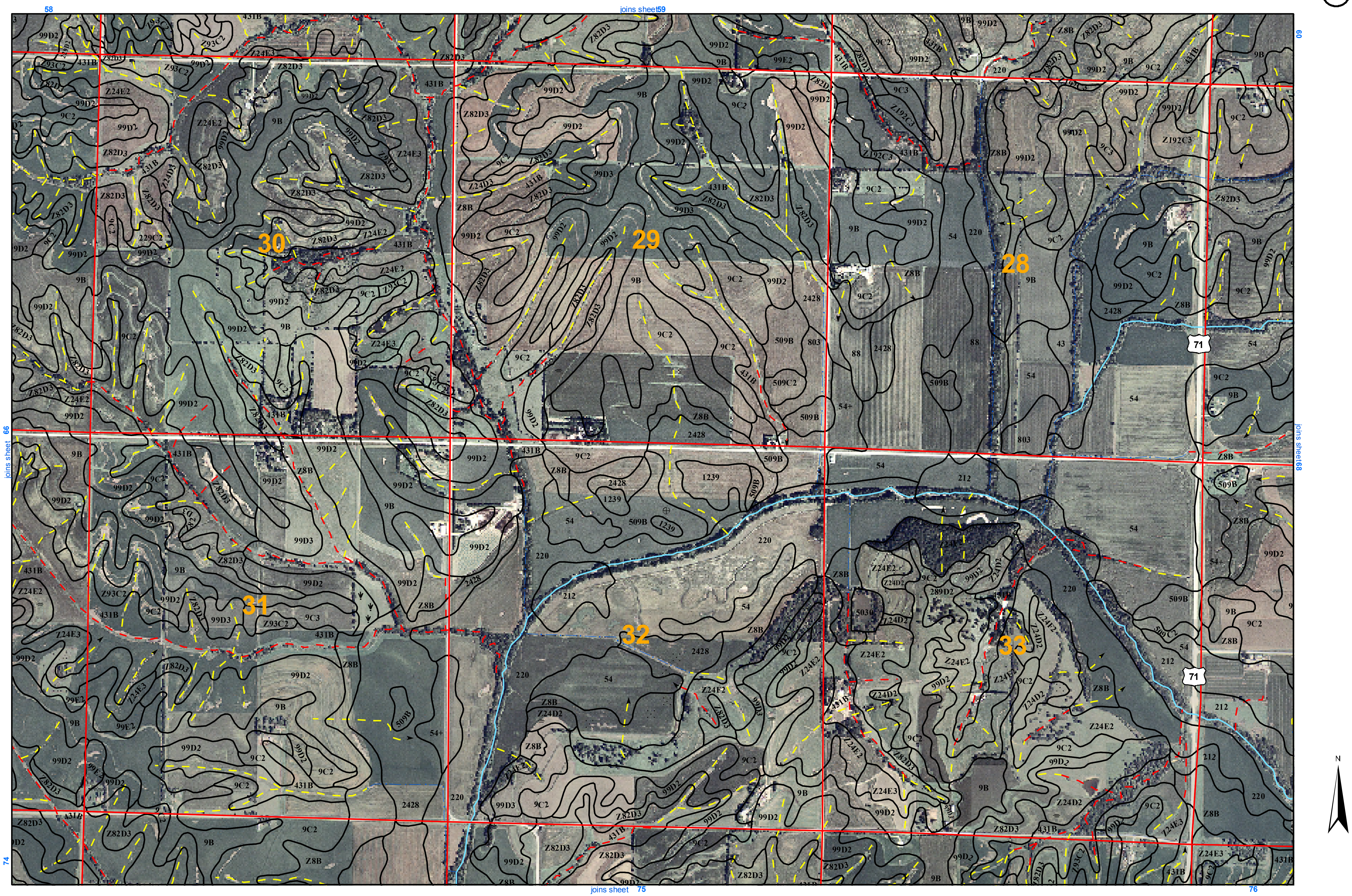
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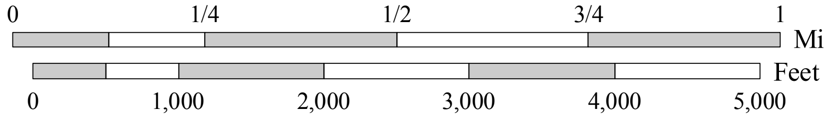
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Township 75N Range 36W

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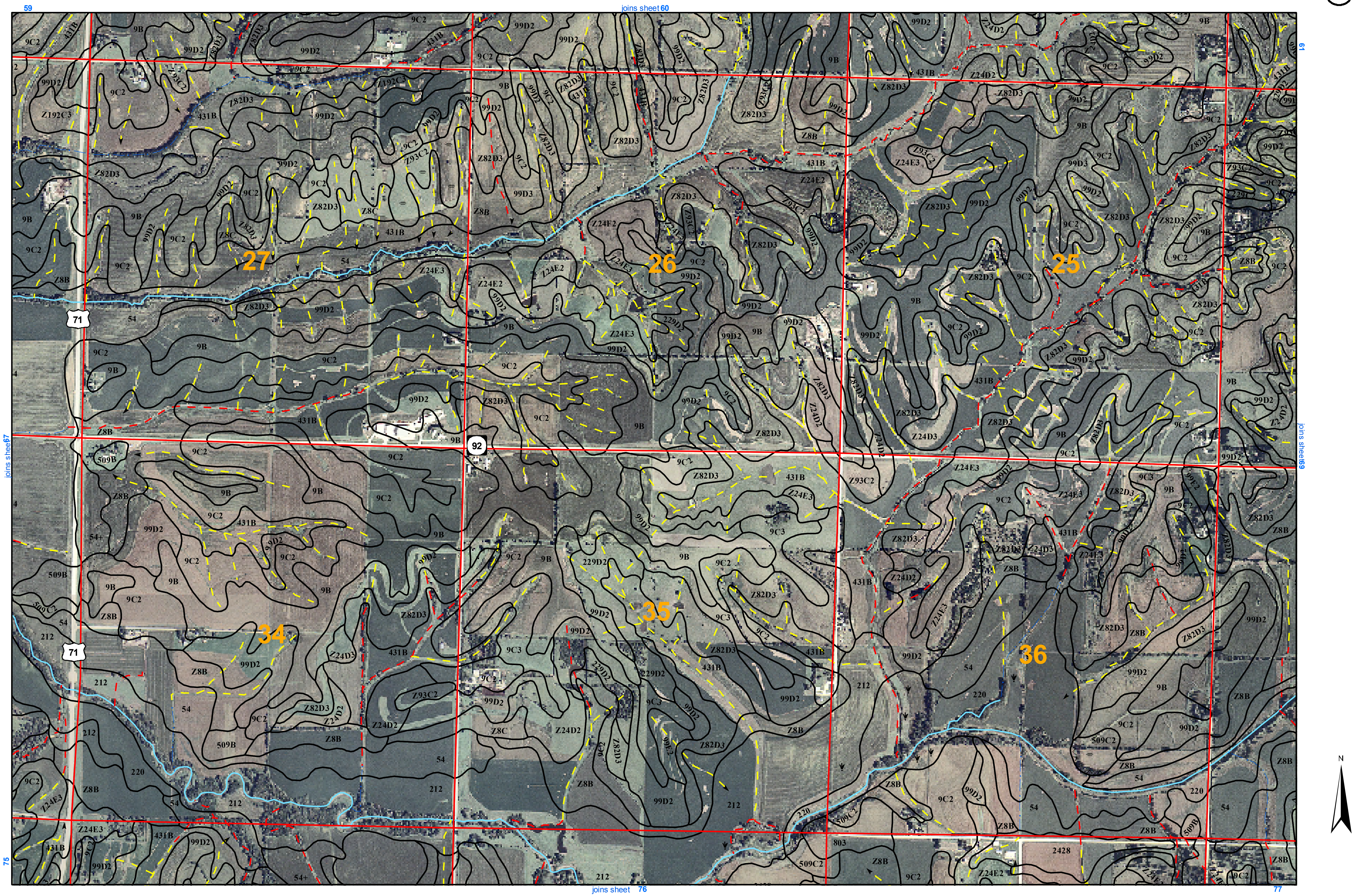
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Township 75N Range 35W

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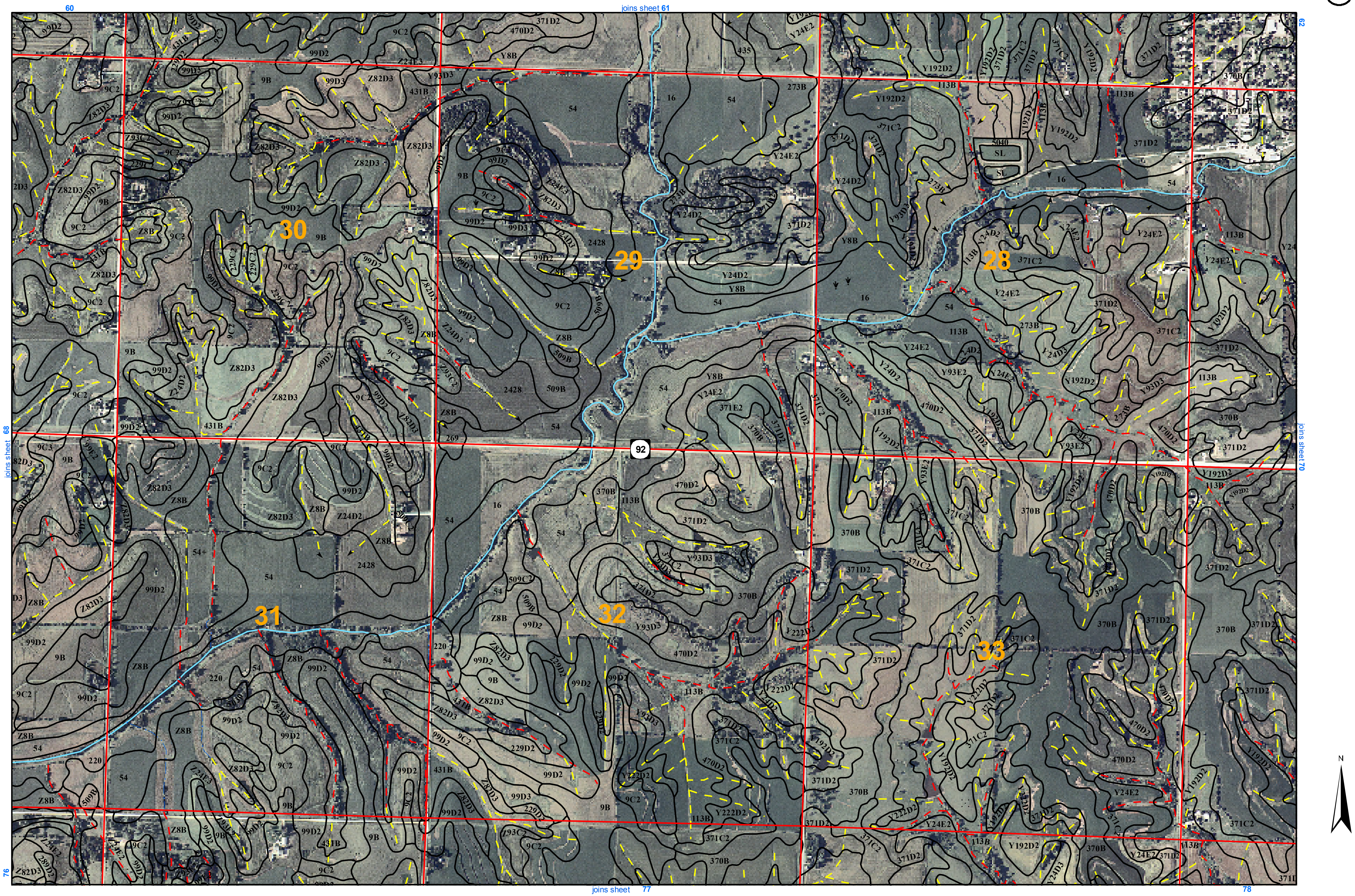
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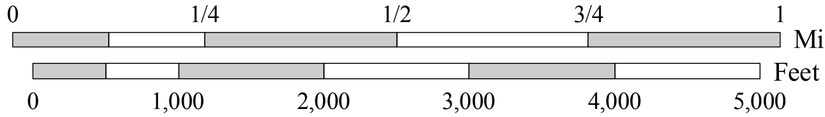
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Township 75N Range 35W

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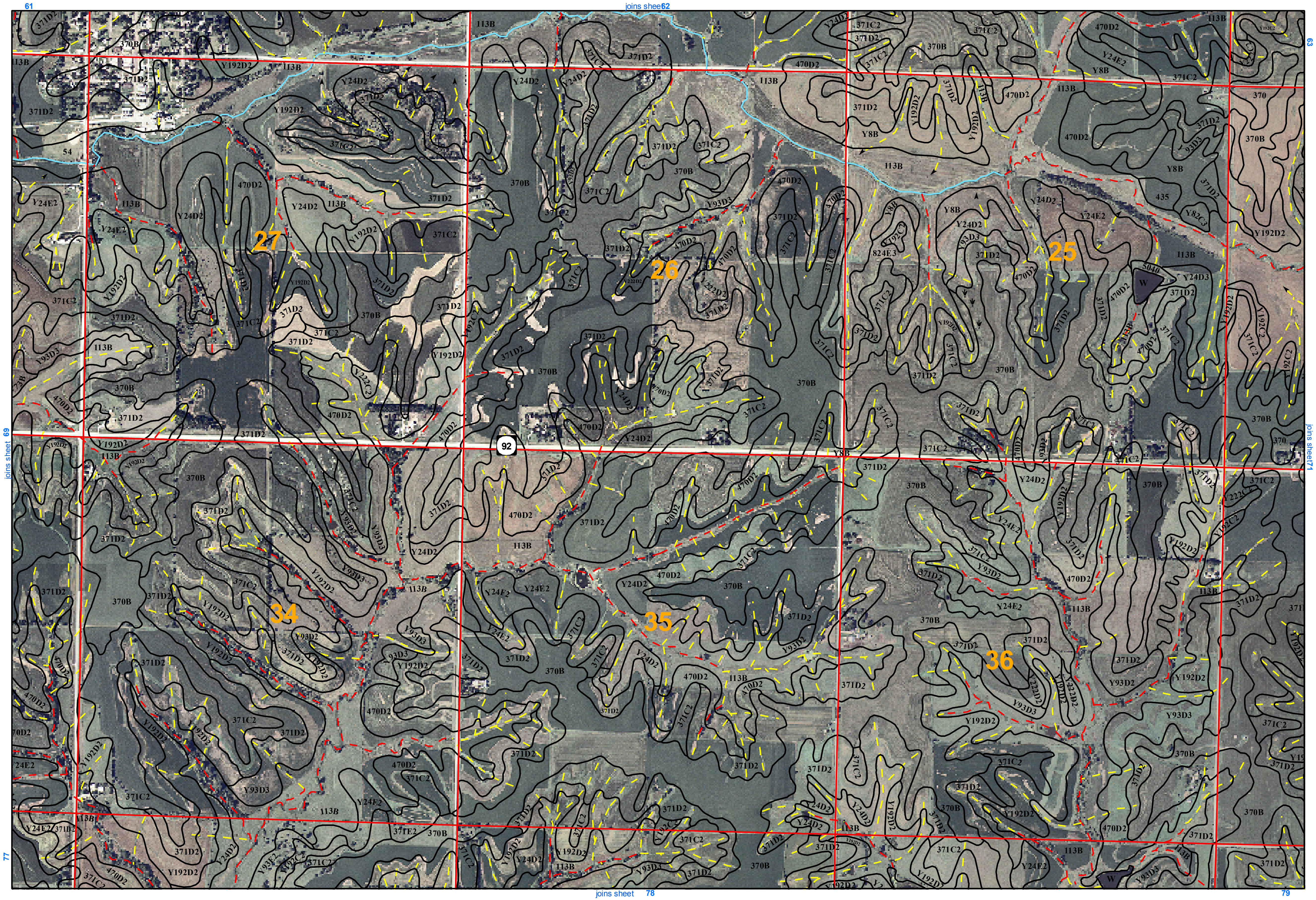
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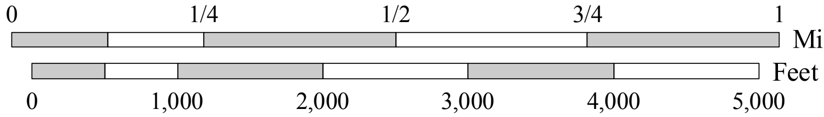
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United States Department of Agriculture
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Township 75N Range 34W

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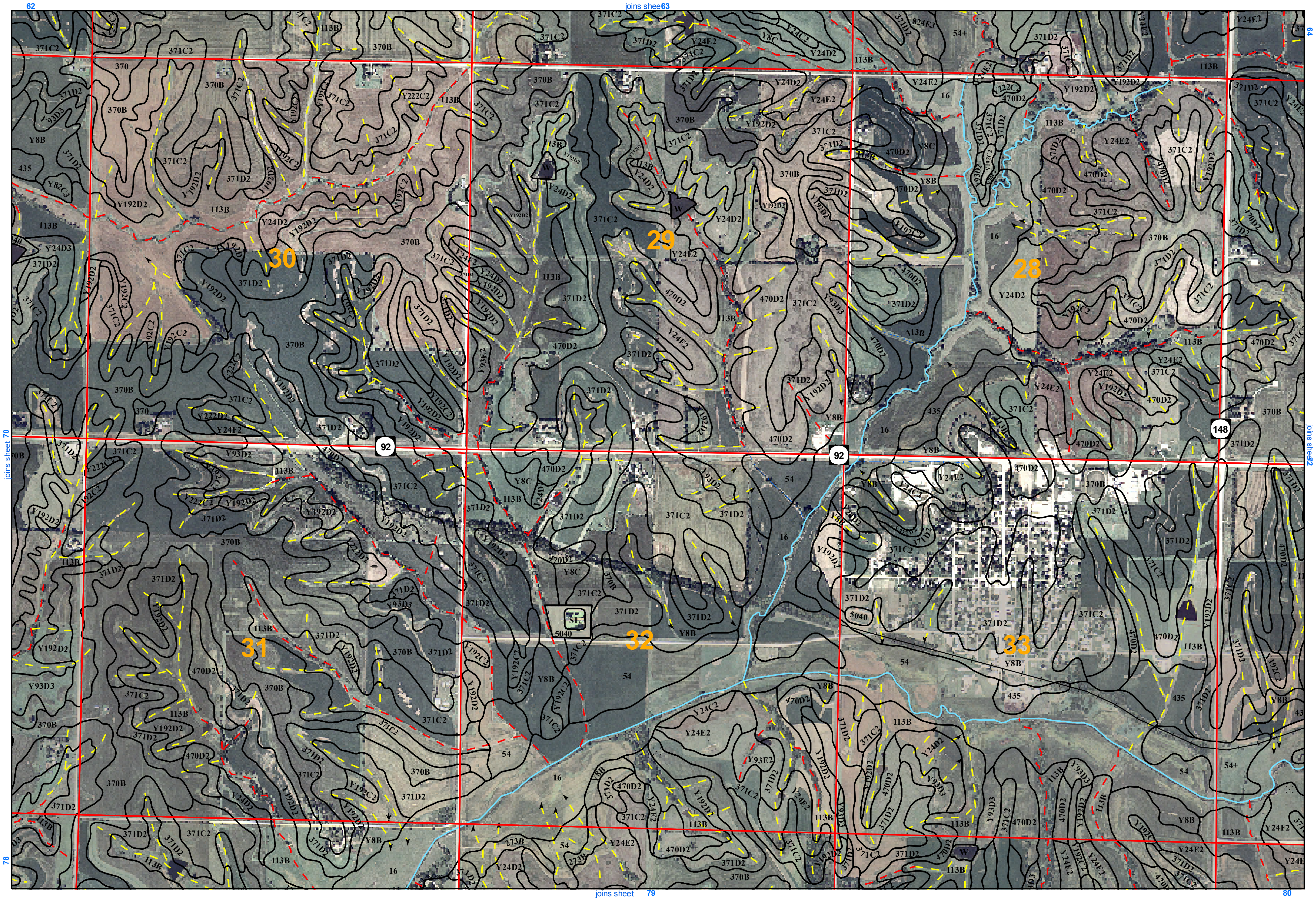
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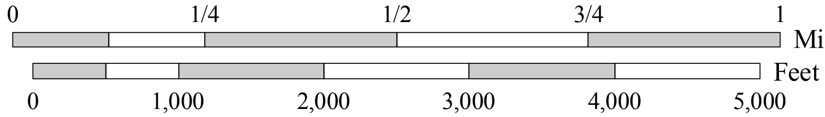
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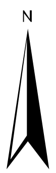

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Township 75N Range 34W

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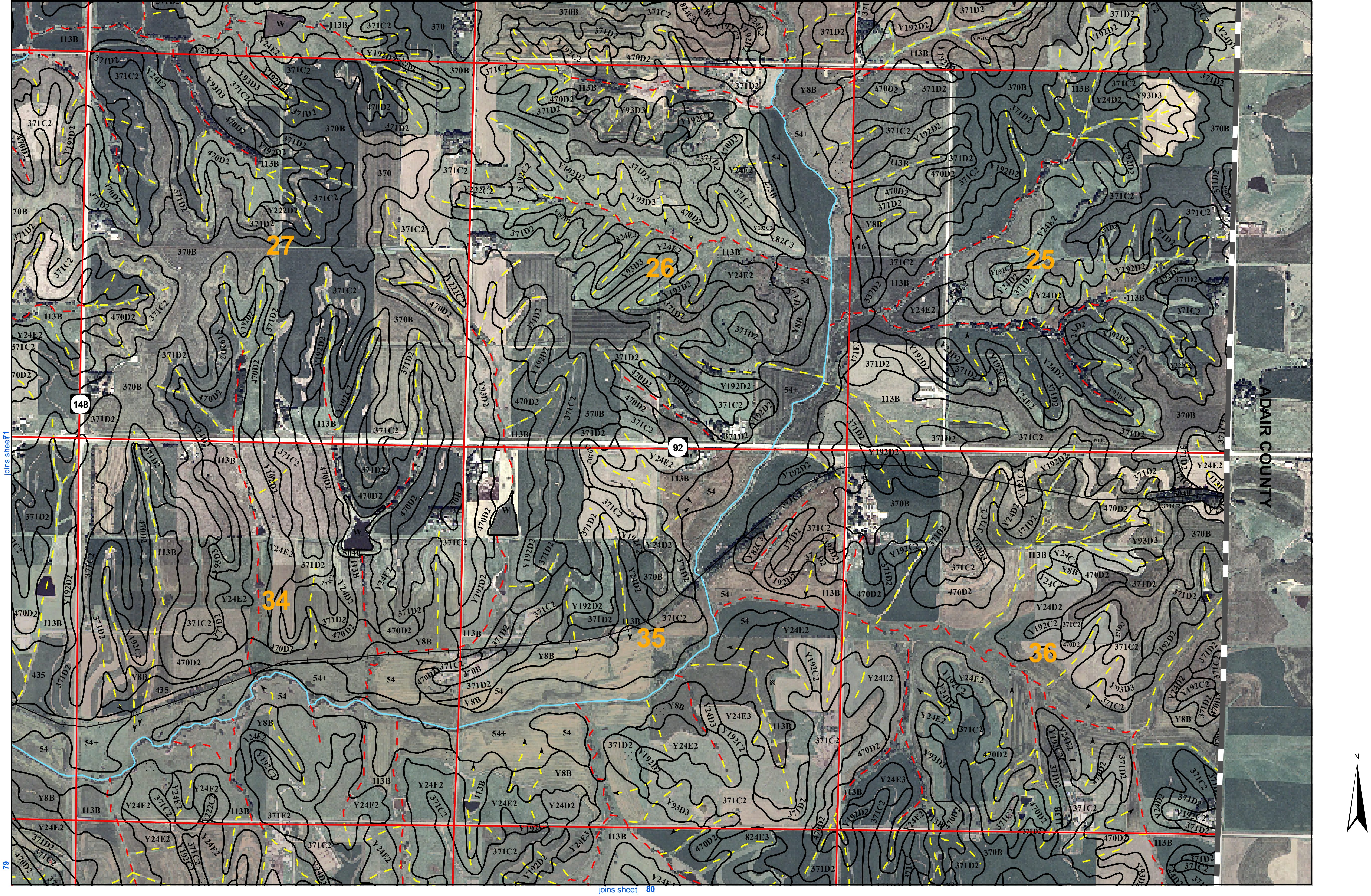

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Township 74N Range 37W

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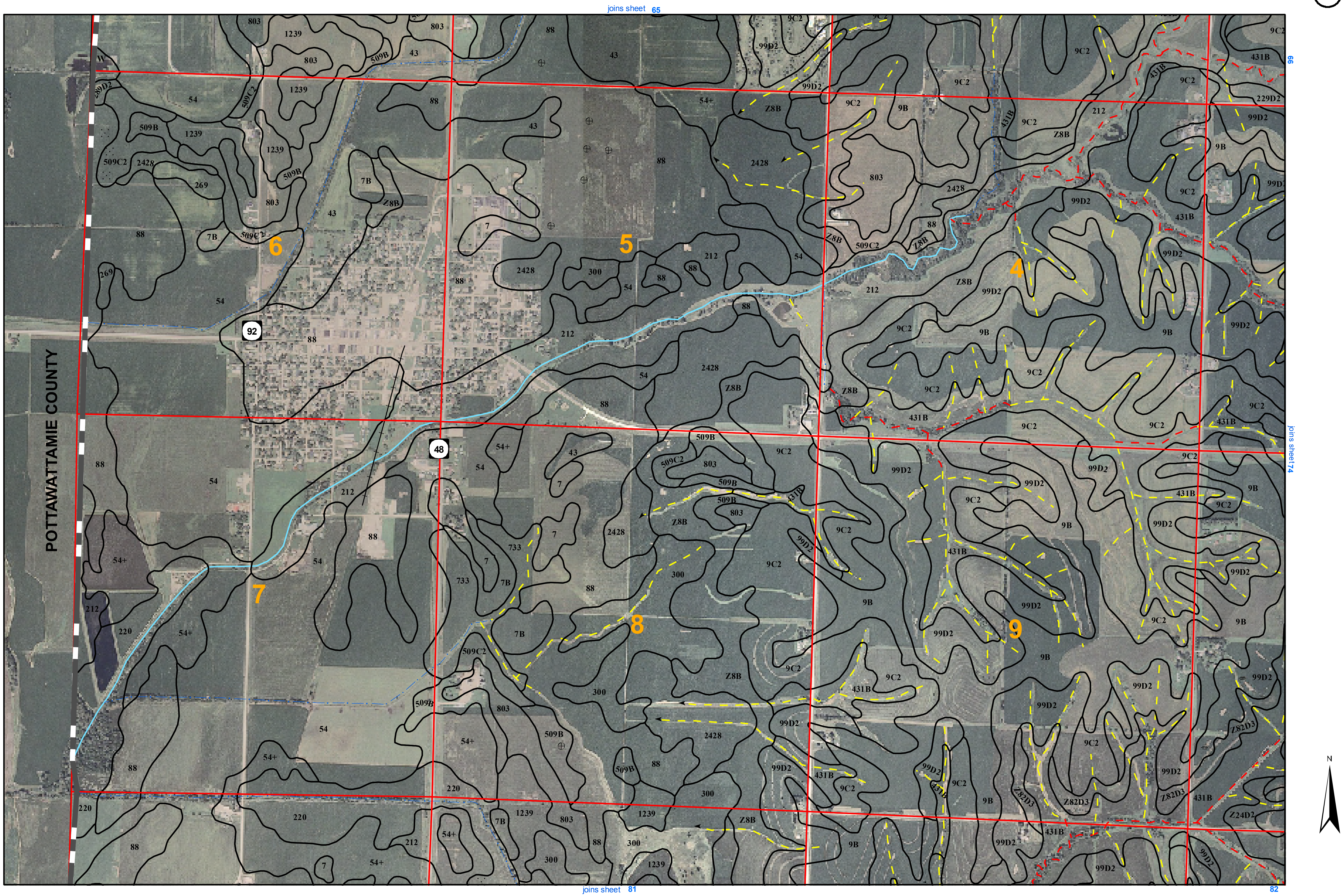

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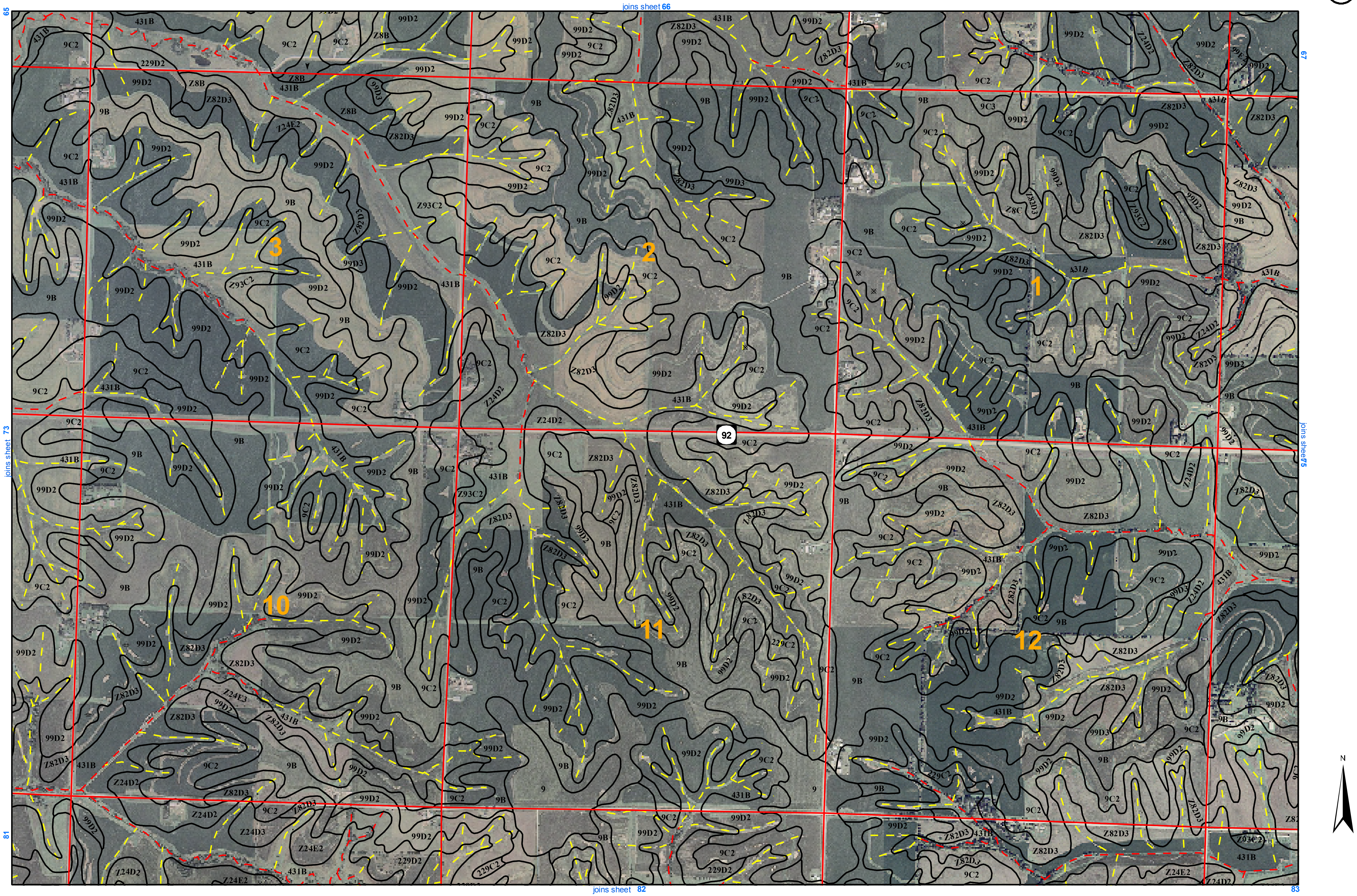
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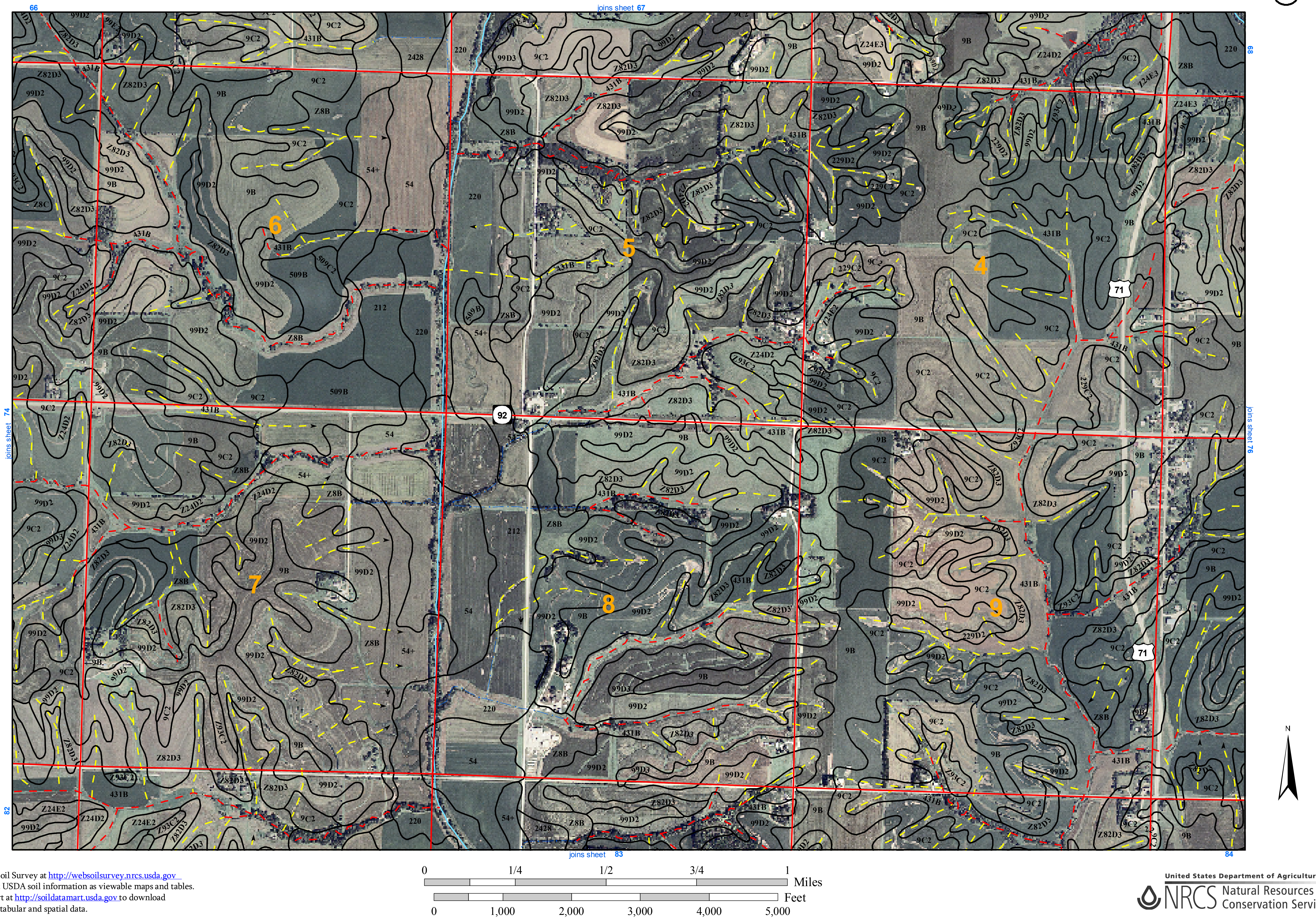

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Township 74N Range 36W

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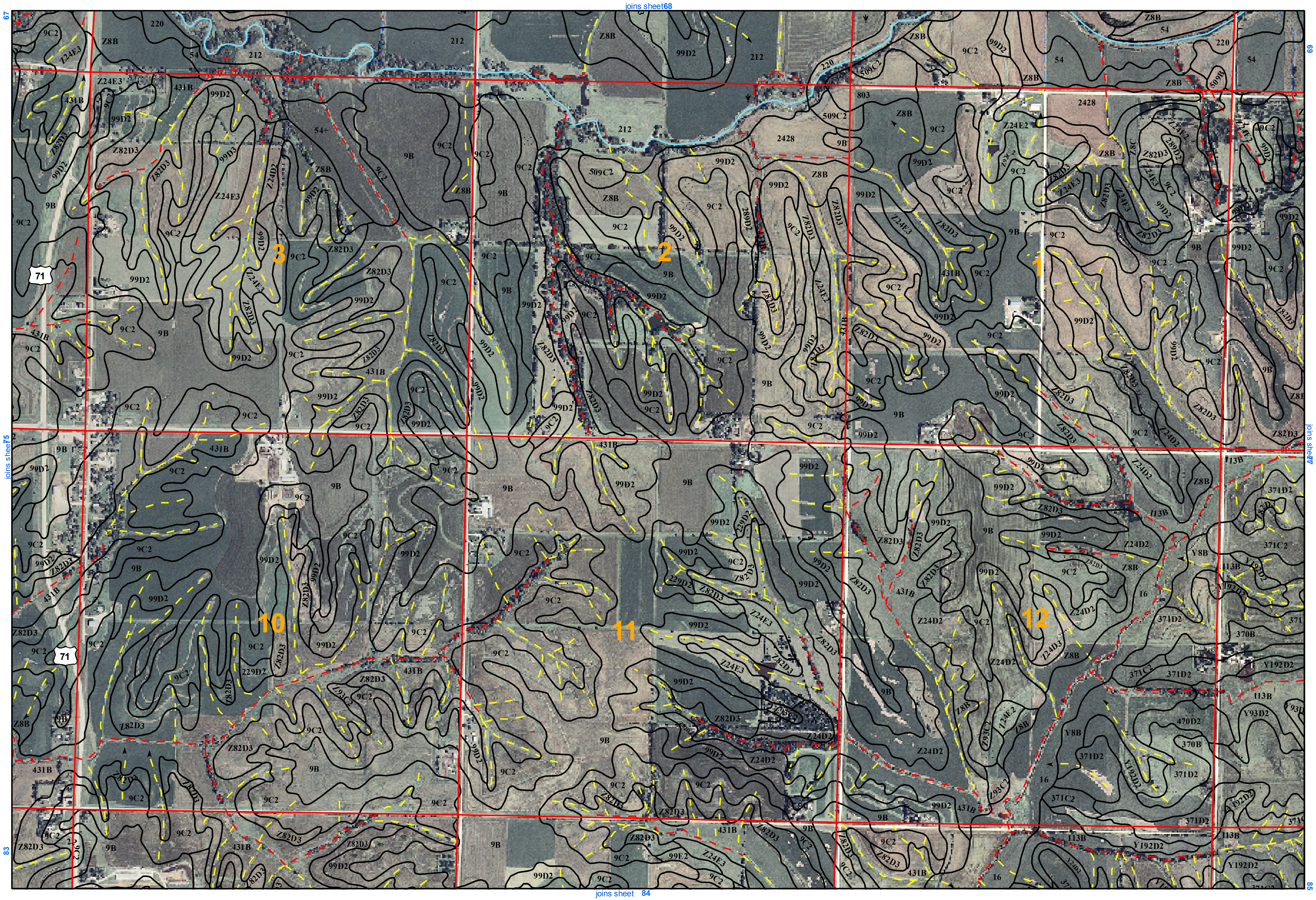
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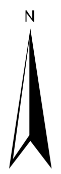

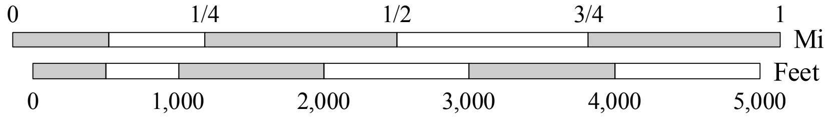
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Township 74N Range 35W

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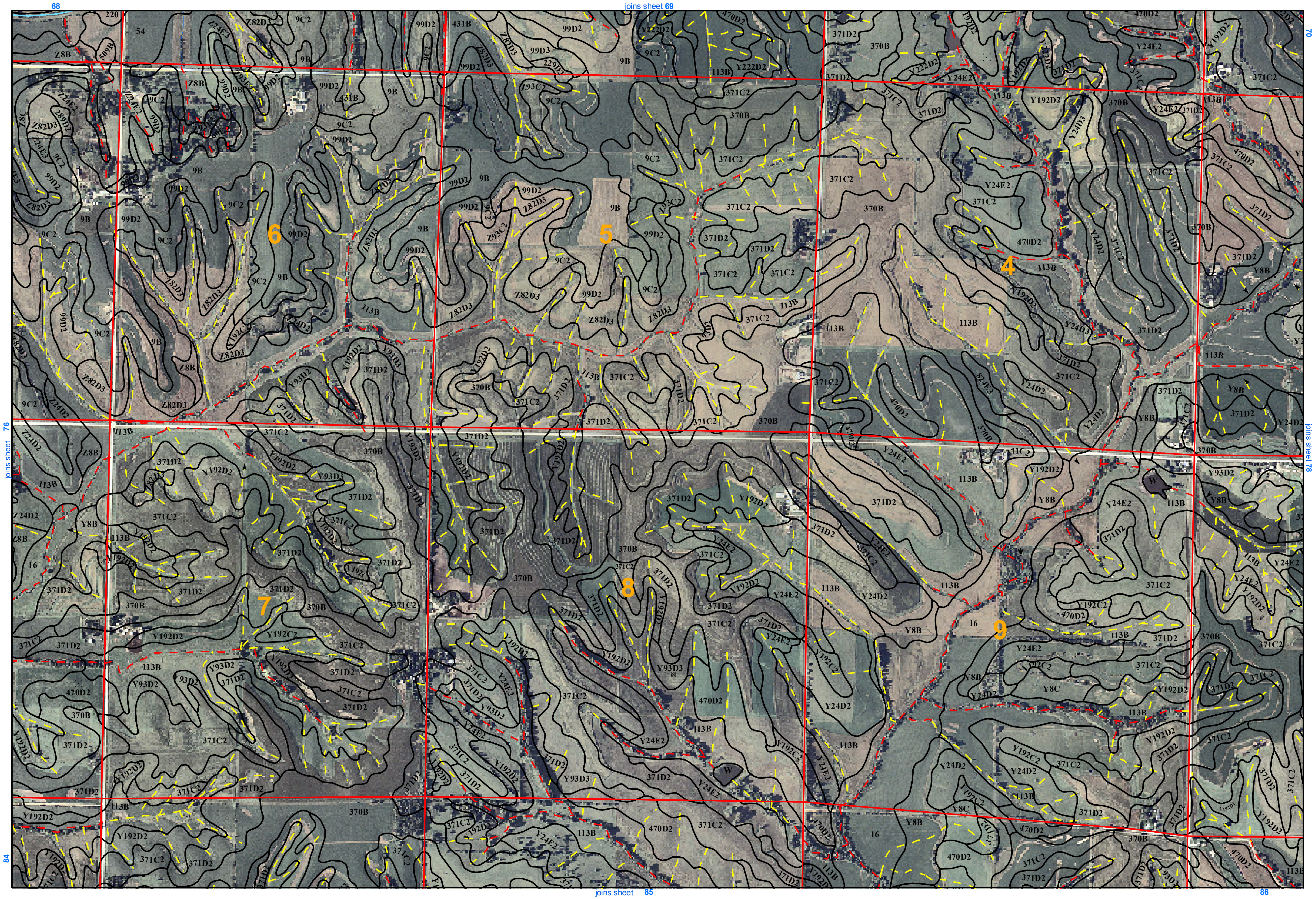
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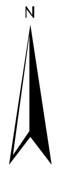

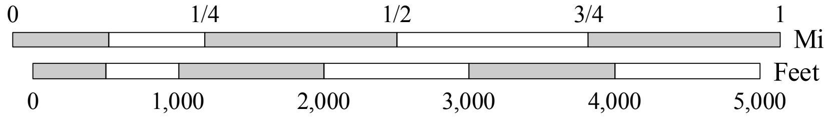
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Township 74N Range 35W

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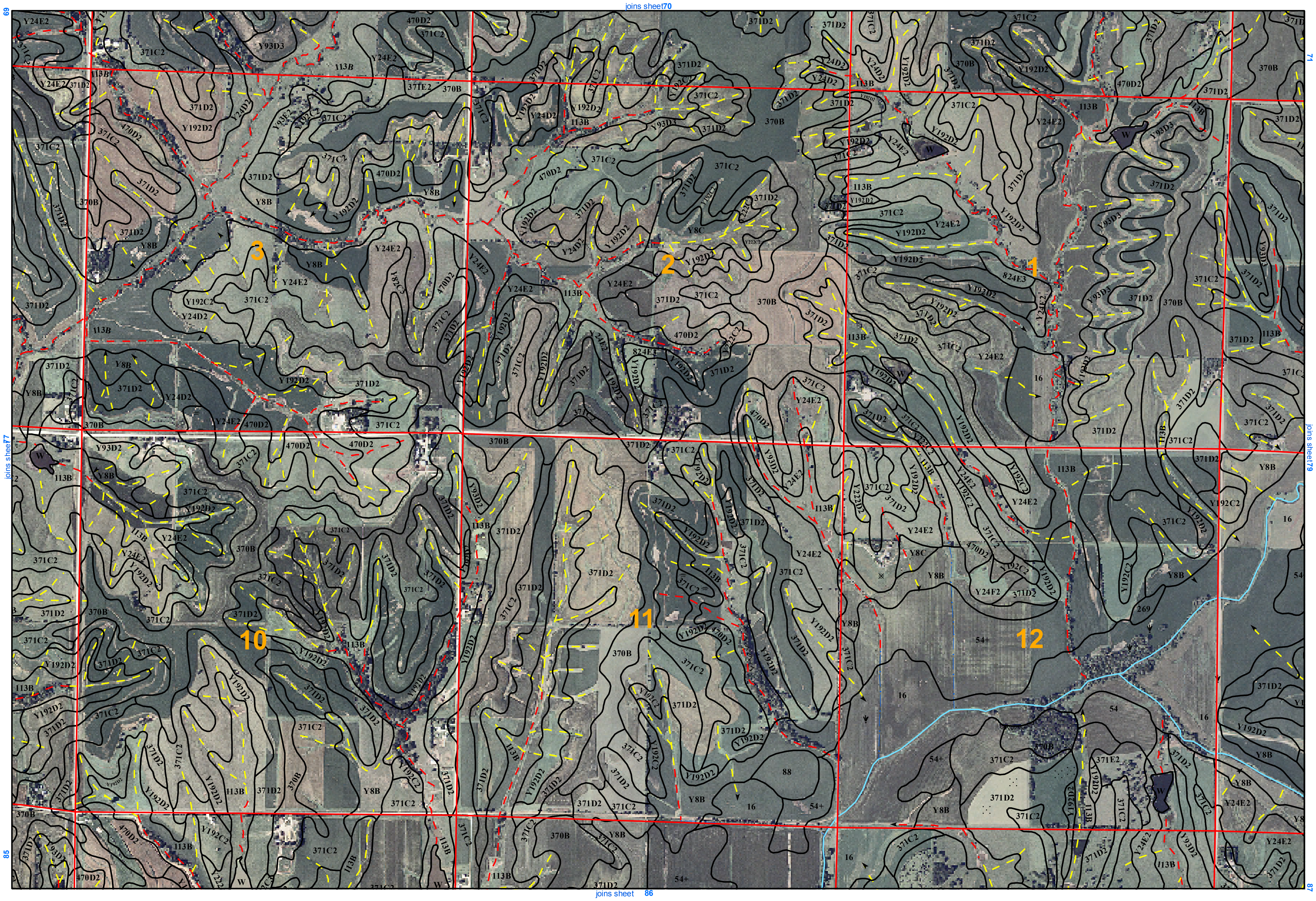

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0 1/4 1/2 3/4 1 Miles

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United States Department of Agriculture
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Township 74N Range 34W

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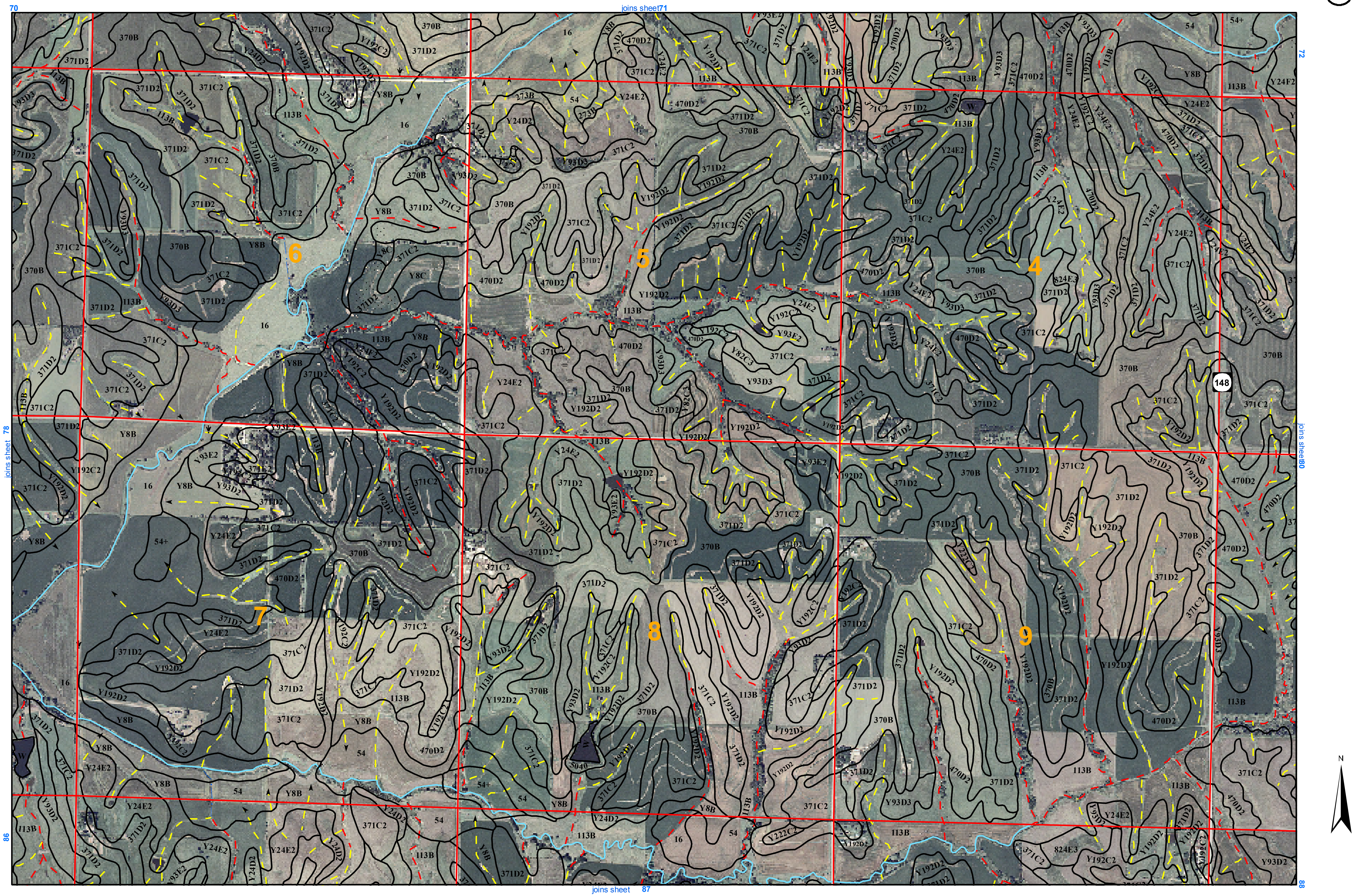
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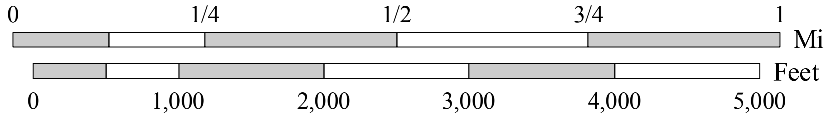
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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 74N Range 34W

Soil Survey of Cass County, Iowa

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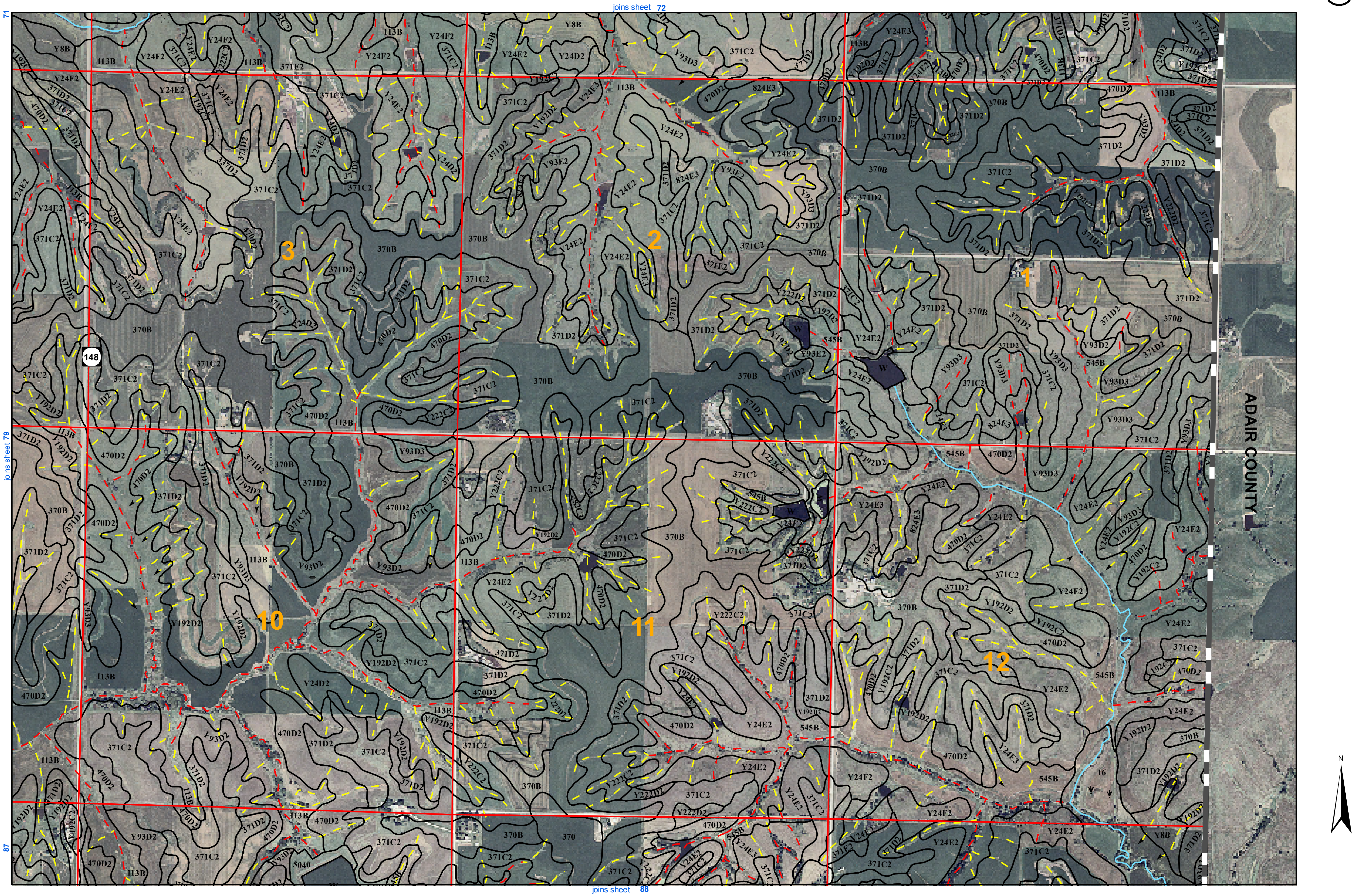
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.



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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 74N Range 37W

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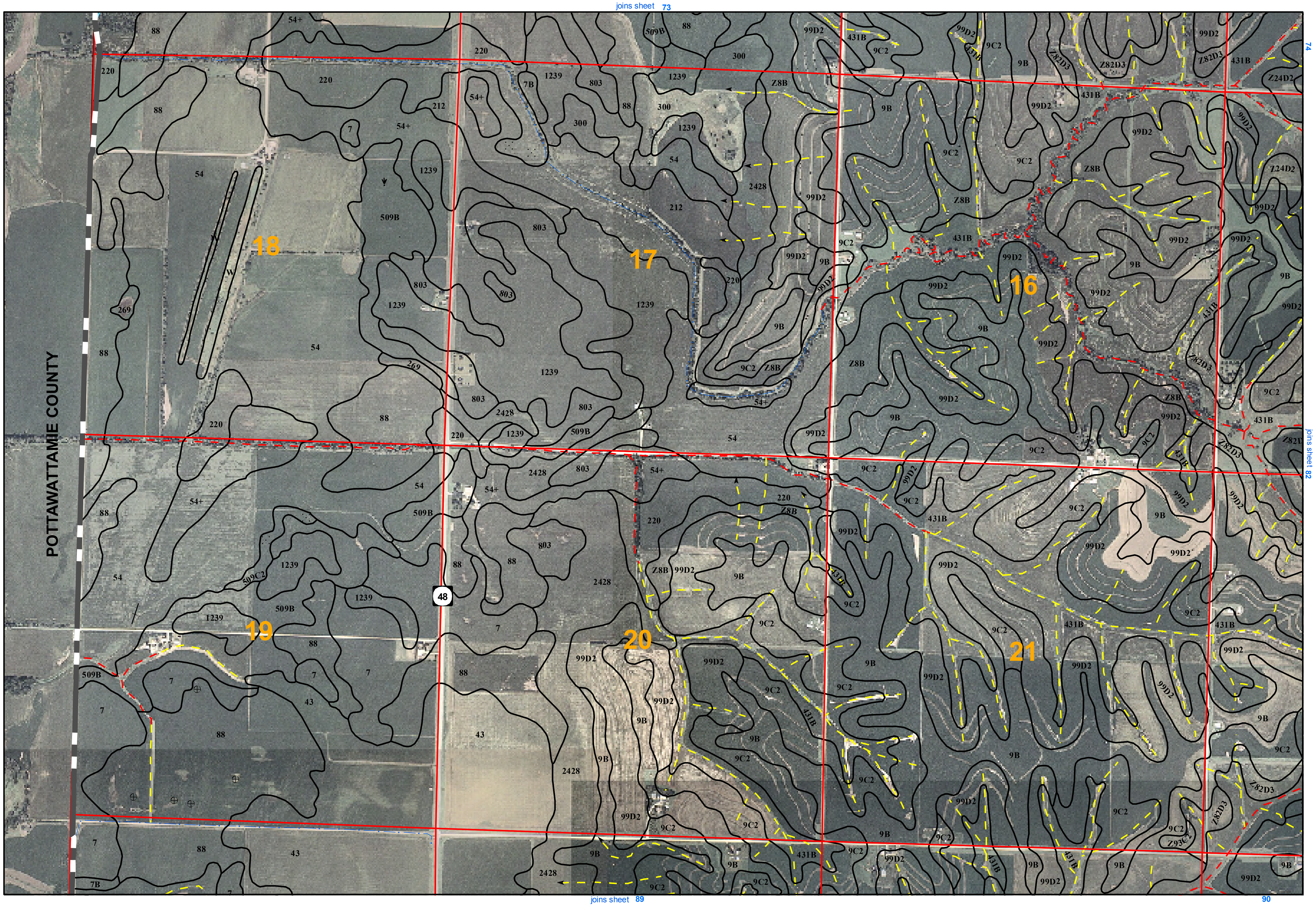
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.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joins sheet 74
joins sheet 82
joins sheet 89
90
POTTAWATTAMIE COUNTY
18
17
16
19
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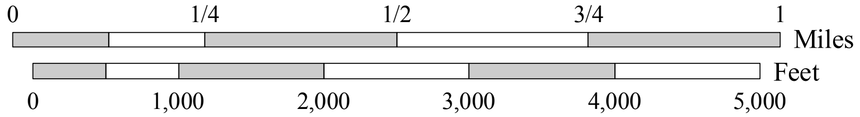
21
48
N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Township 74N Range 37W

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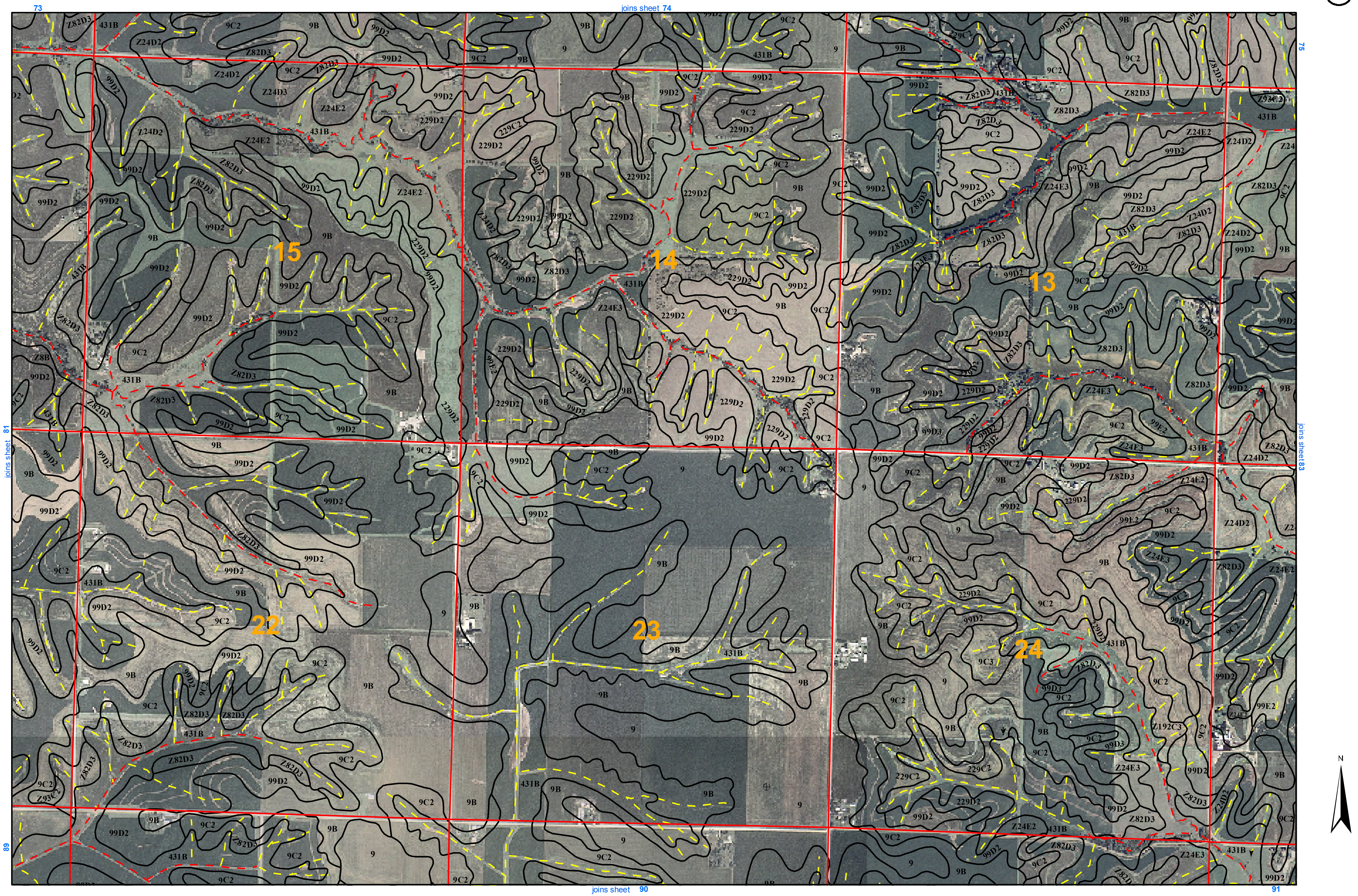
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.



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Township 74N Range 36W

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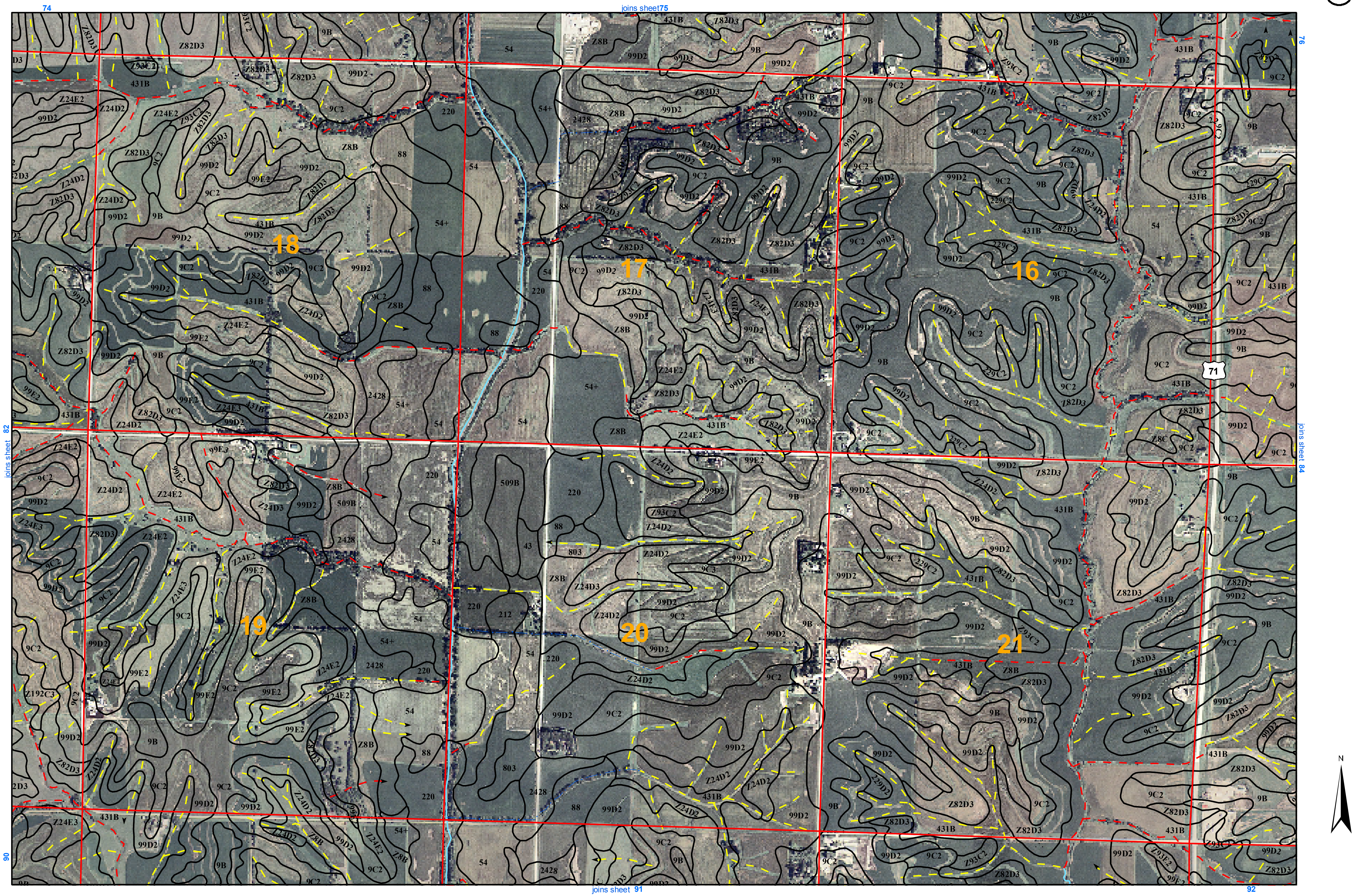
74
joins sheet 75
76
joins sheet 82
joins sheet 84
90
joins sheet 91
92
18
17
16
19
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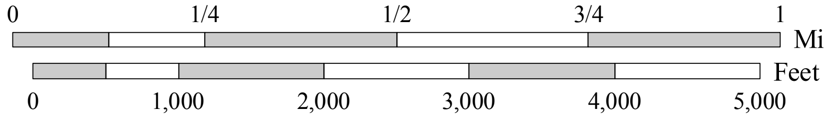
21
71
N
Z82D3
99D2
9C2
9B
431B
Z24E2
Z24D2
Z8B
54
54+
88
220
2428
509B
43
803
212
Z93C2
229C2
99E2
Z192C3
Z24E3
Z24D3
99B2
Z8C
9C3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Feet
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Township 74N Range 36W

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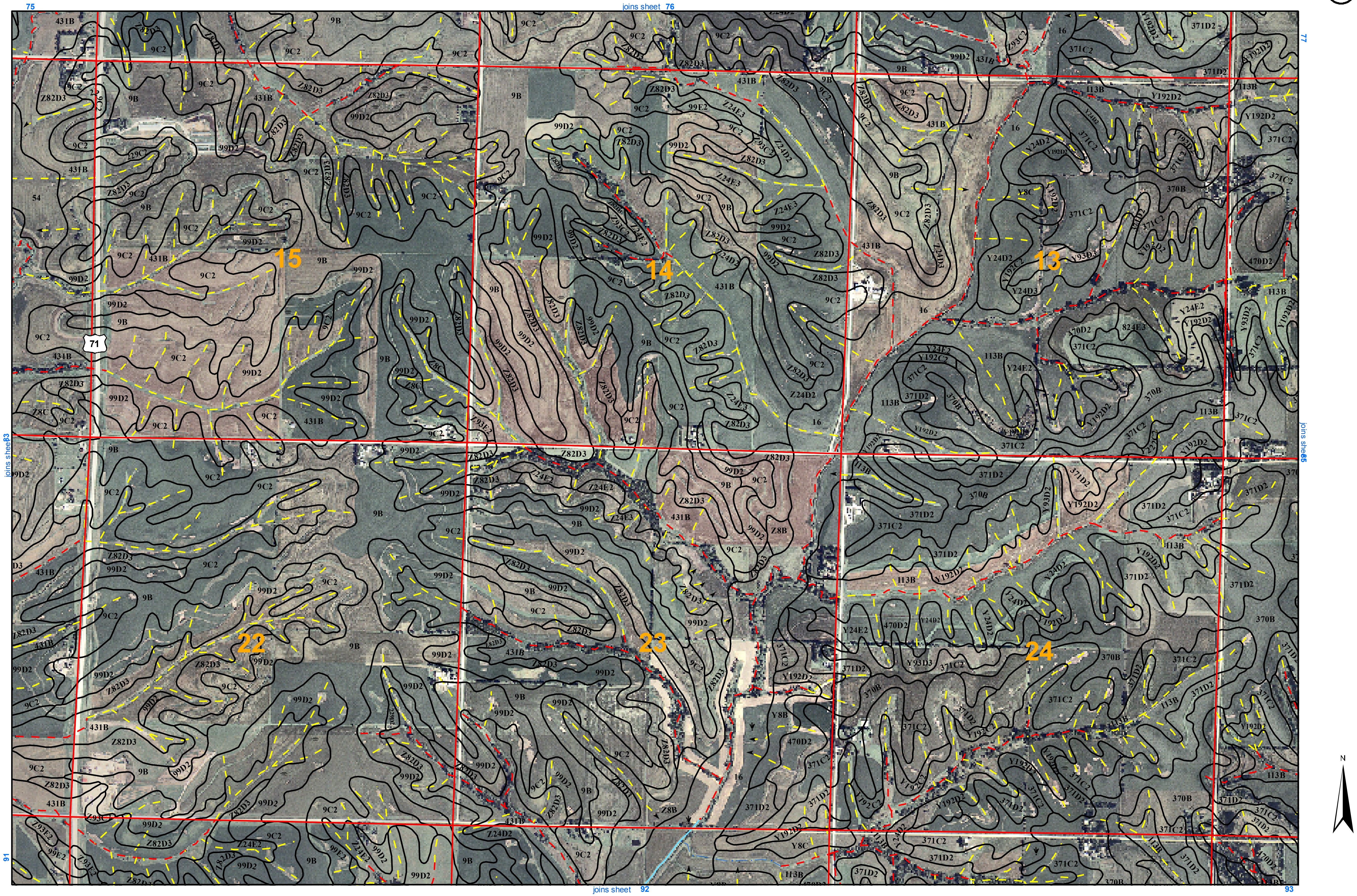
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joins sheet 83
joins sheet 85
91
joins sheet 92
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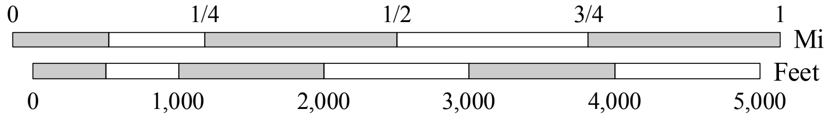
15
14
13
22
23
24
71
N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Feet

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Township 74N Range 35W

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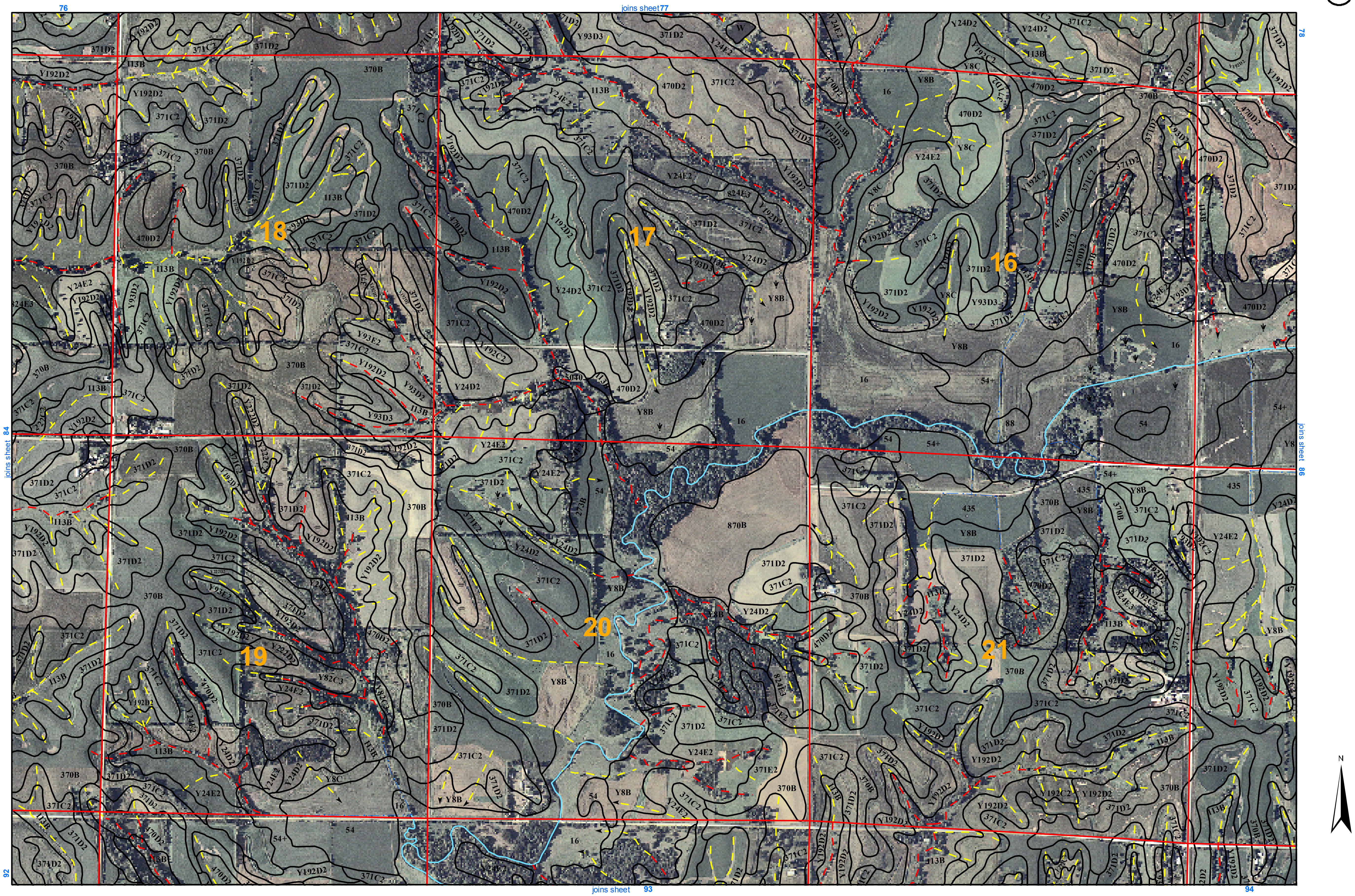
76
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78
18
17
16
joins sheet 84
joins sheet 86
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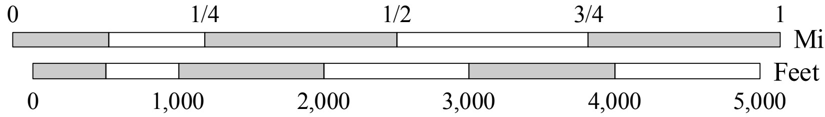
20
21
92
joins sheet 93
94
N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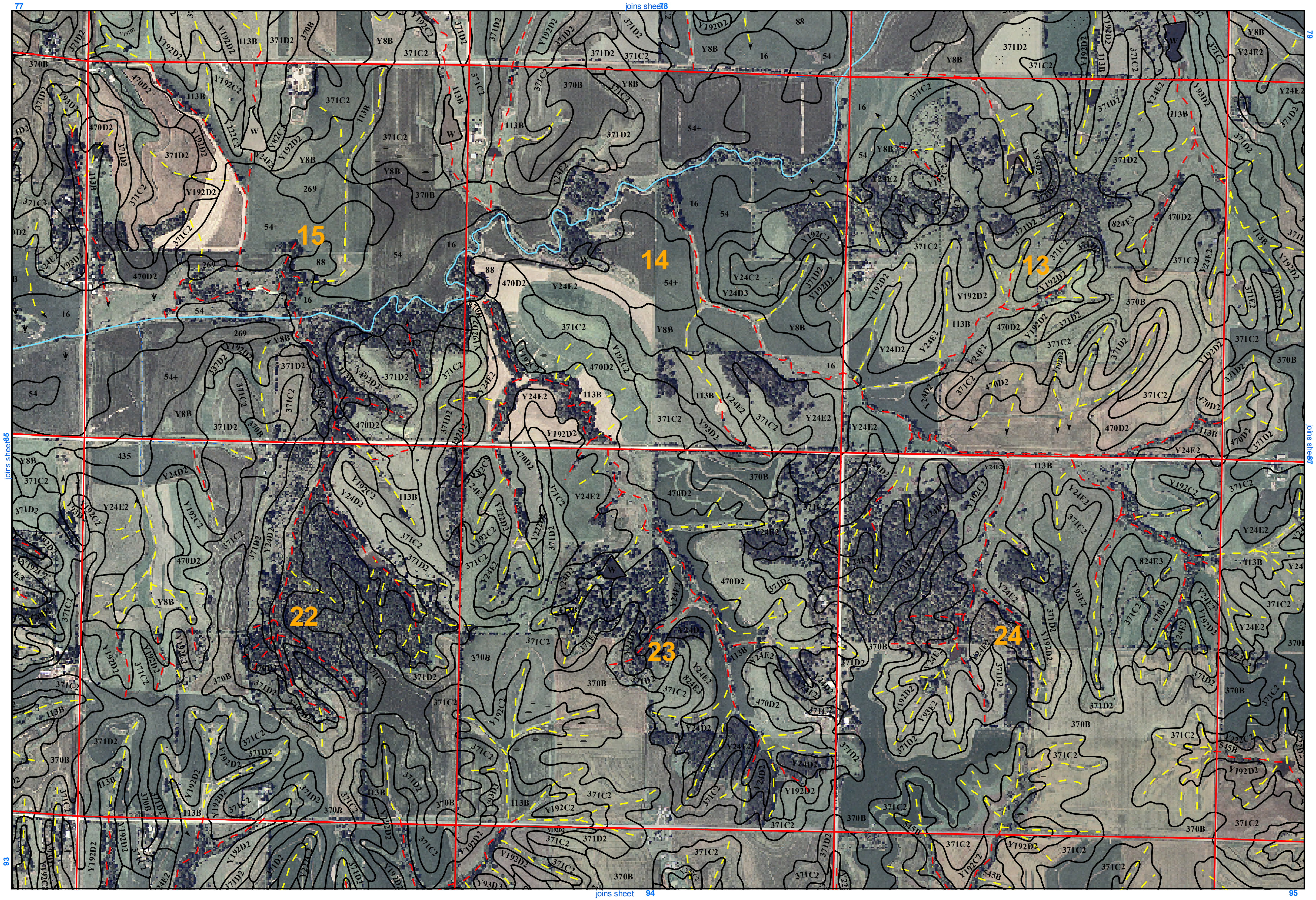
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79
joins sheet 85
joins sheet 87
93
joins sheet 94
95
15
14
13
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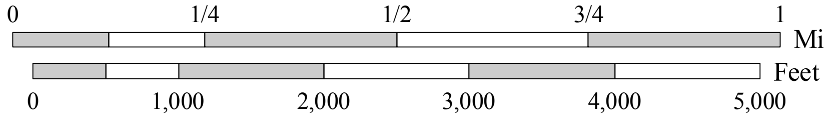
23
24


0
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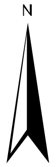

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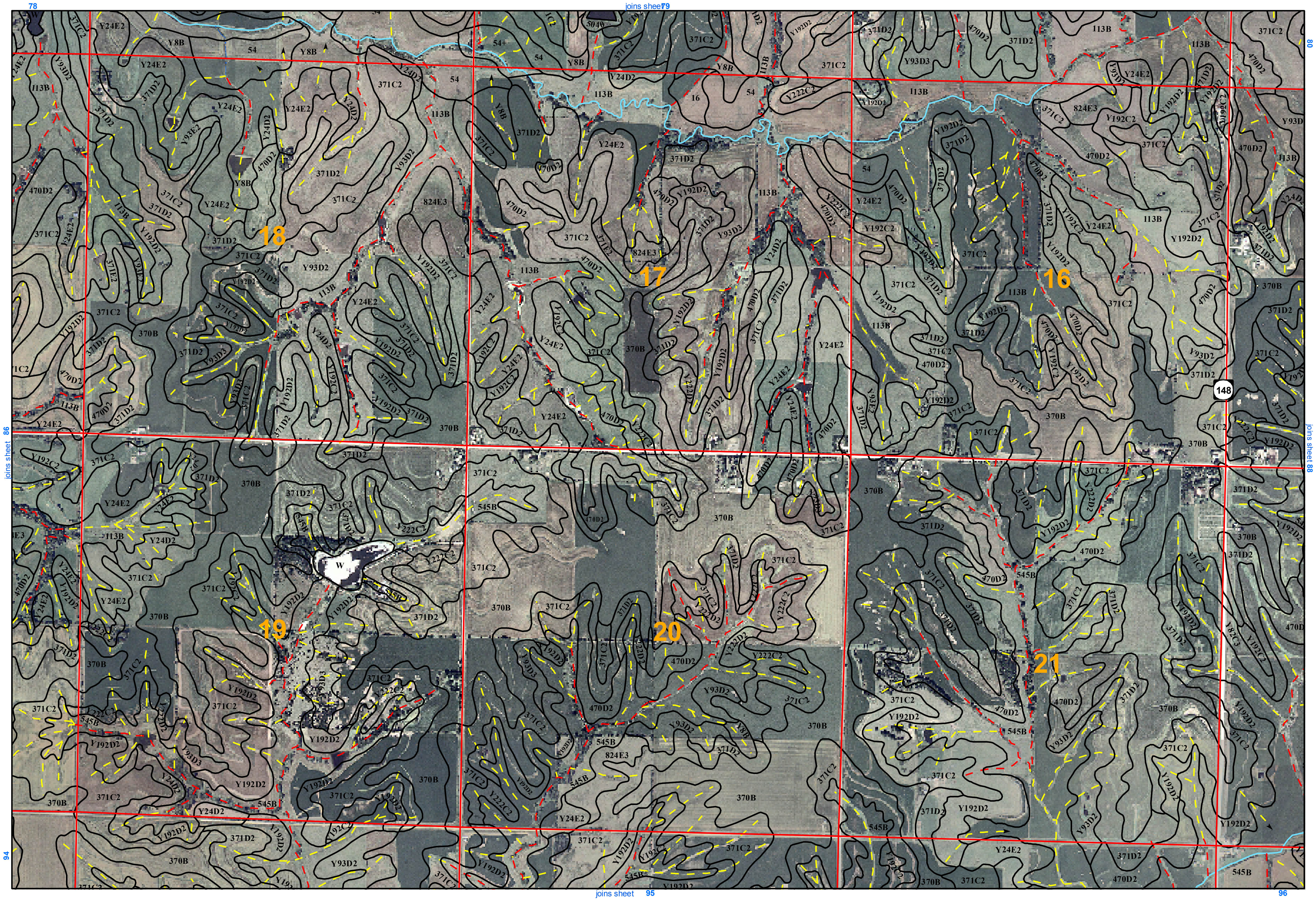
78
joins sheet 79
80
joins sheet 86
joins sheet 88
94
joins sheet 95
96
18
17
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19
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21
148
W
371C2
371D2
370B
Y24E2
Y192D2
470D2
113B
54
Y8B
824E3
545B
Y93D2
Y222C2

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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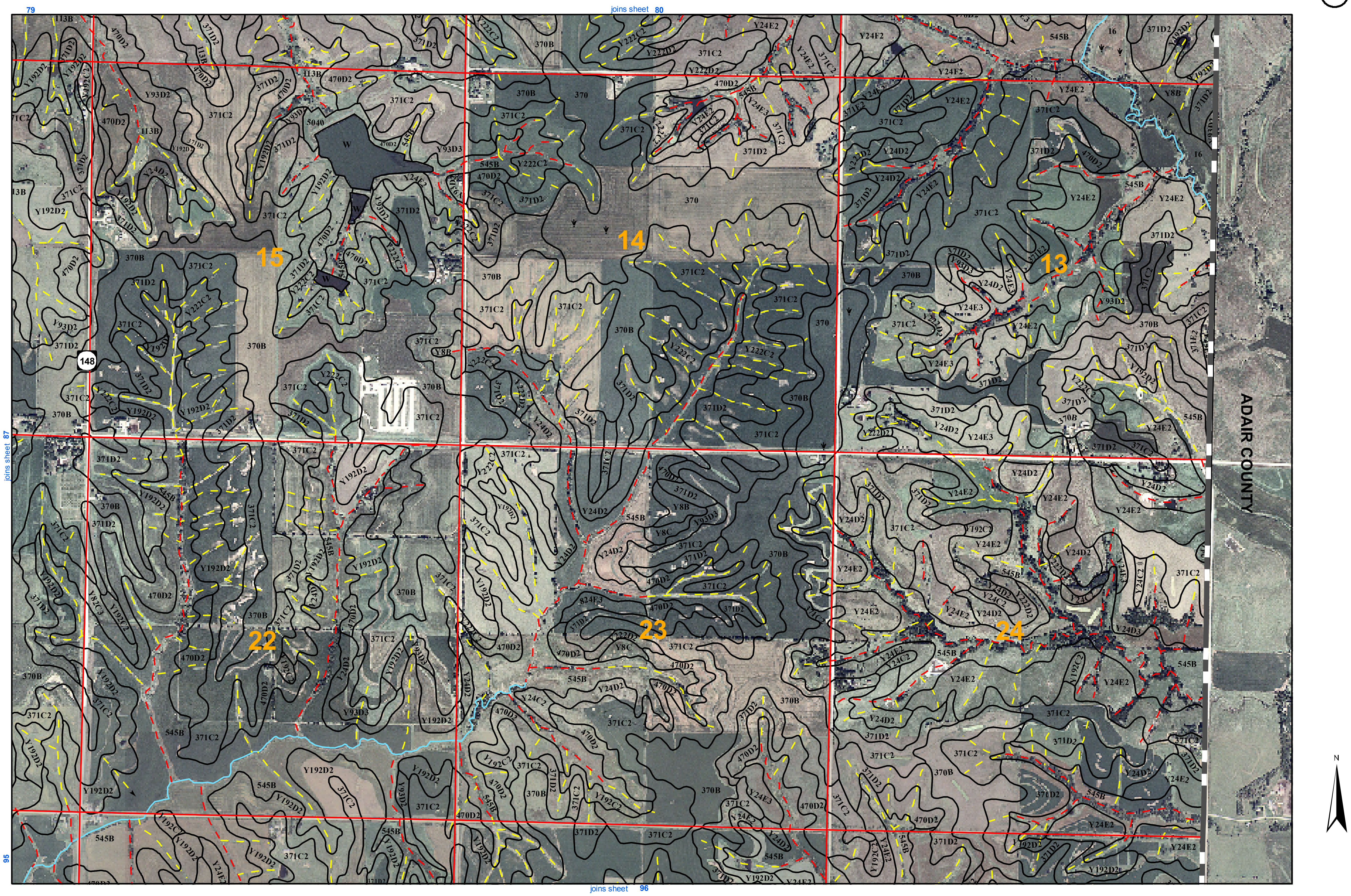
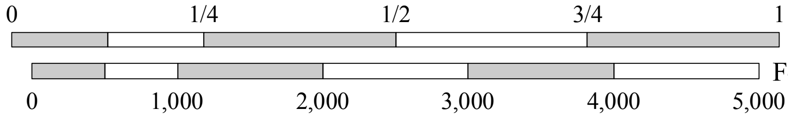

79
joins sheet 80
joins sheet 87
95
joins sheet 96
15
14
13
22
23
24
148
ADAIR COUNTY
N
W
370B
371C2
371D2
470D2
545B
Y24E2
Y24D2
Y192D2
Y222C2
Y93D3
Y8B
Y8C
113B
16
370
5040
824E3
Y24E3
Y24F2
Y24C2
Y222D2
Y93D2
Y82C3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Township 74N Range 37W

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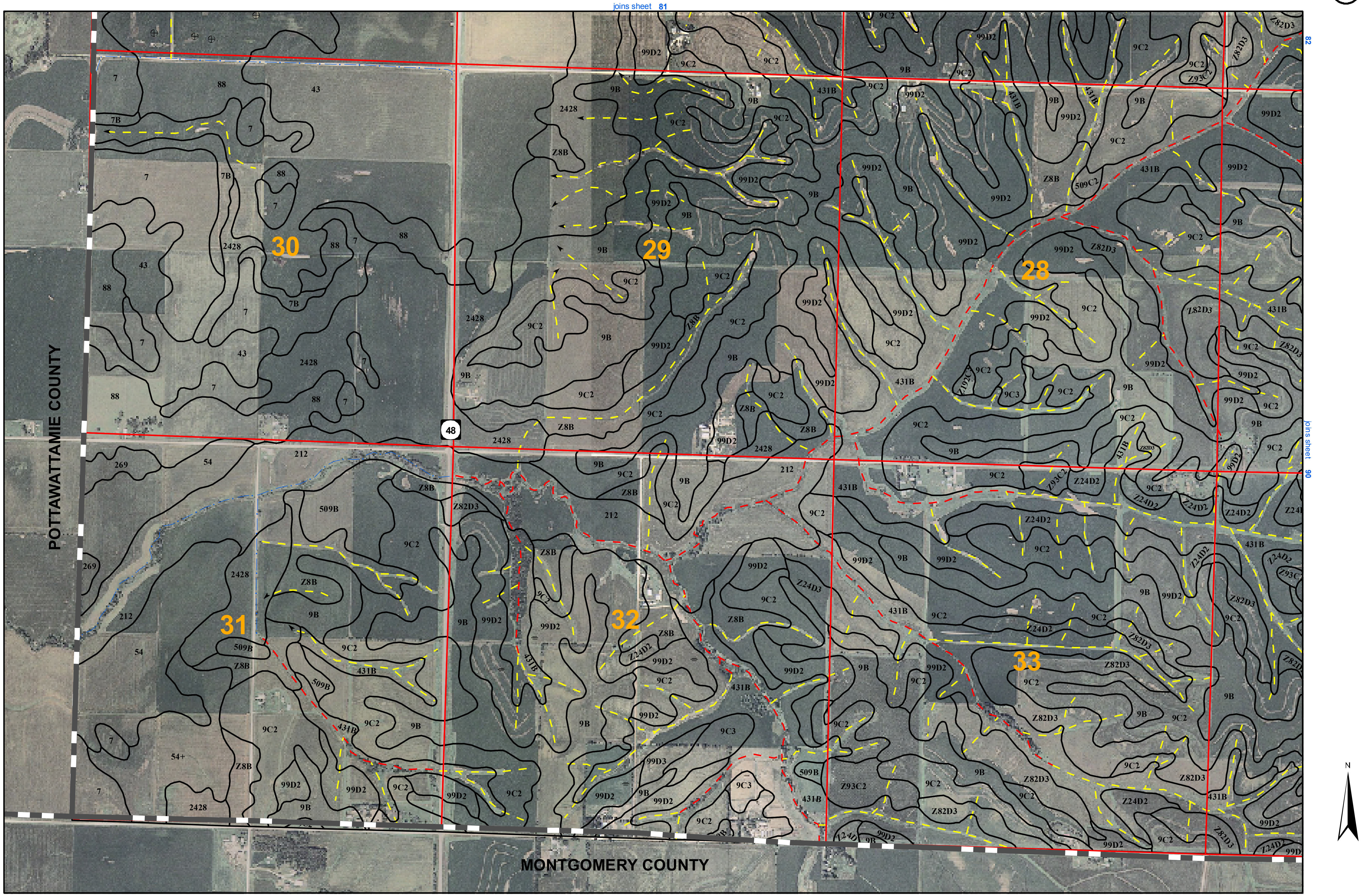
joins sheet 81
82
joins sheet 90
POTTAWATTAMIE COUNTY
MONTGOMERY COUNTY
30
29
28
31
32
33
48
N
7
7B
43
88
2428
54
54+
212
269
509B
9B
9C2
9C3
99D2
99D3
431B
Z8B
Z82D3
Z24D2
Z24D3
Z93C2
509C2

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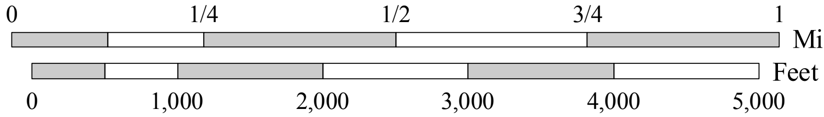
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Feet

United States Department of Agriculture
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Township 74N Range 37W

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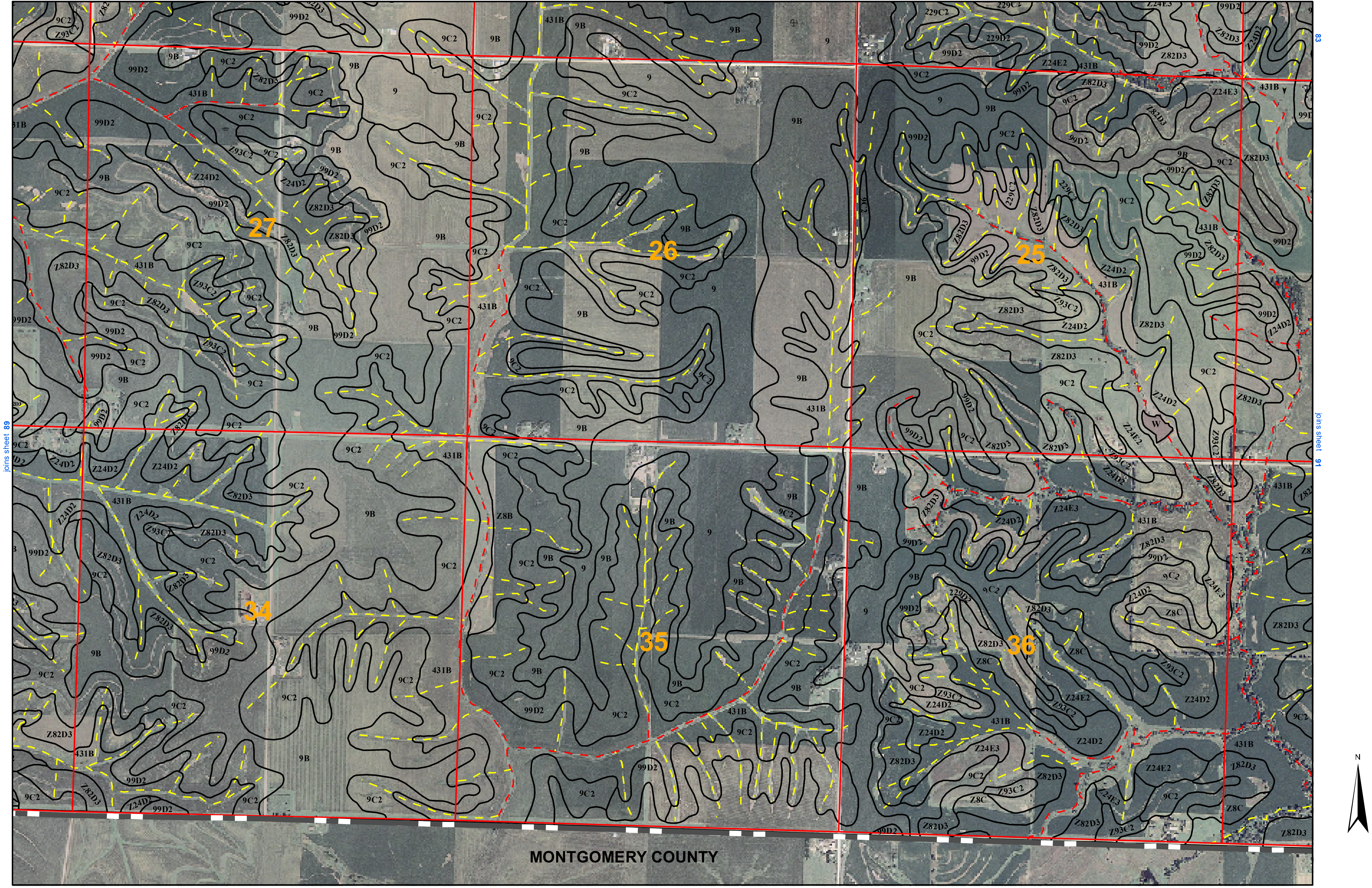
81
joins sheet 82
83
joins sheet 89
joins sheet 91
27
26
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MONTGOMERY COUNTY
N
9B
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Z24E2
Z24E3
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229C2
229D2
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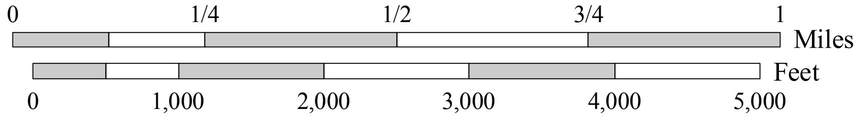
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Township 74N Range 36W

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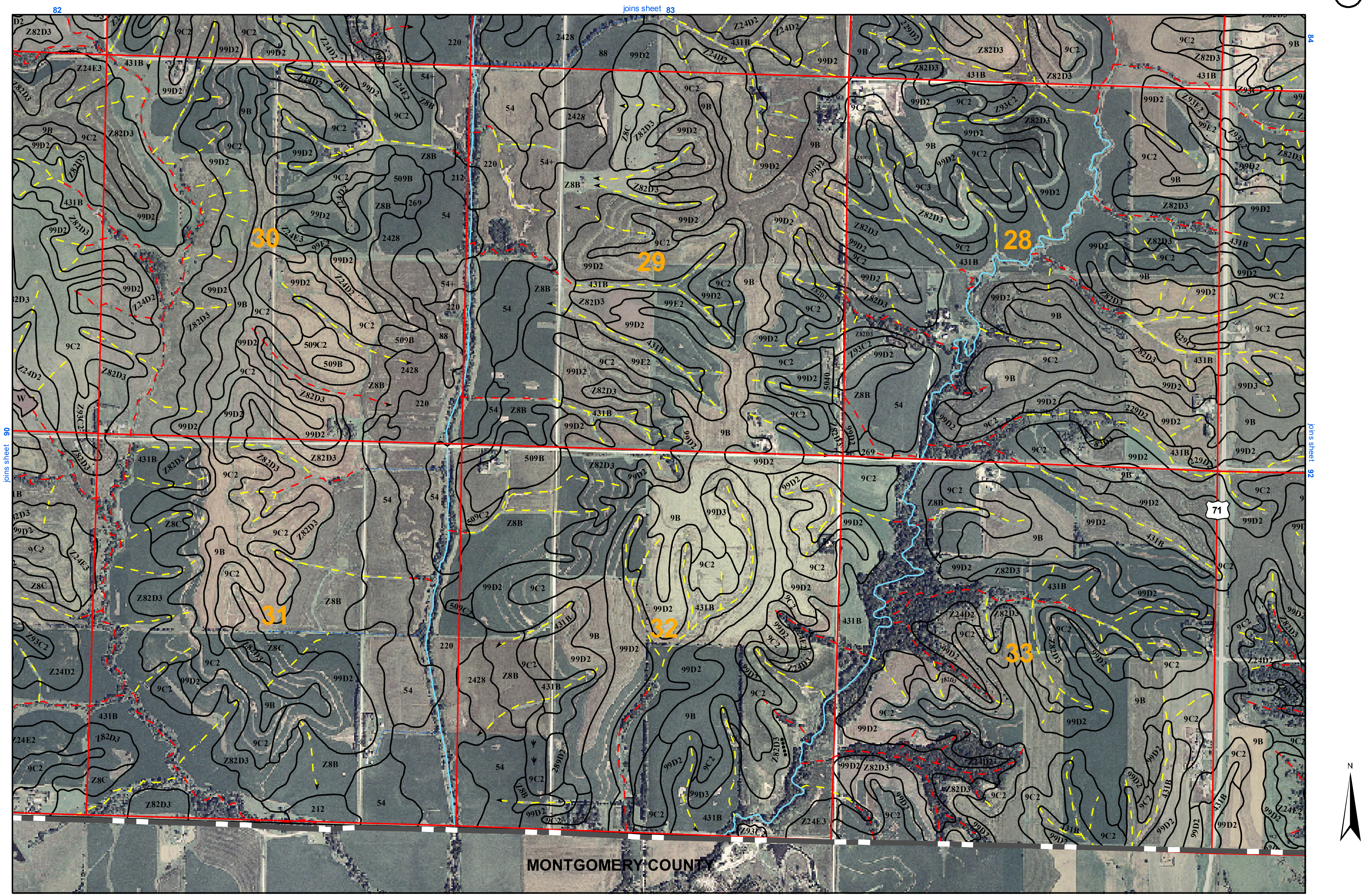
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.


82
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joins sheet 92
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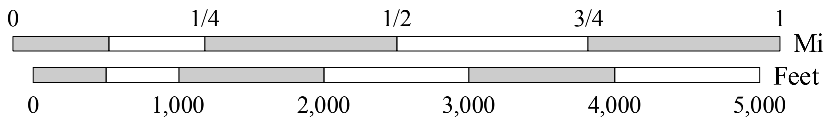
71
MONTGOMERY COUNTY
N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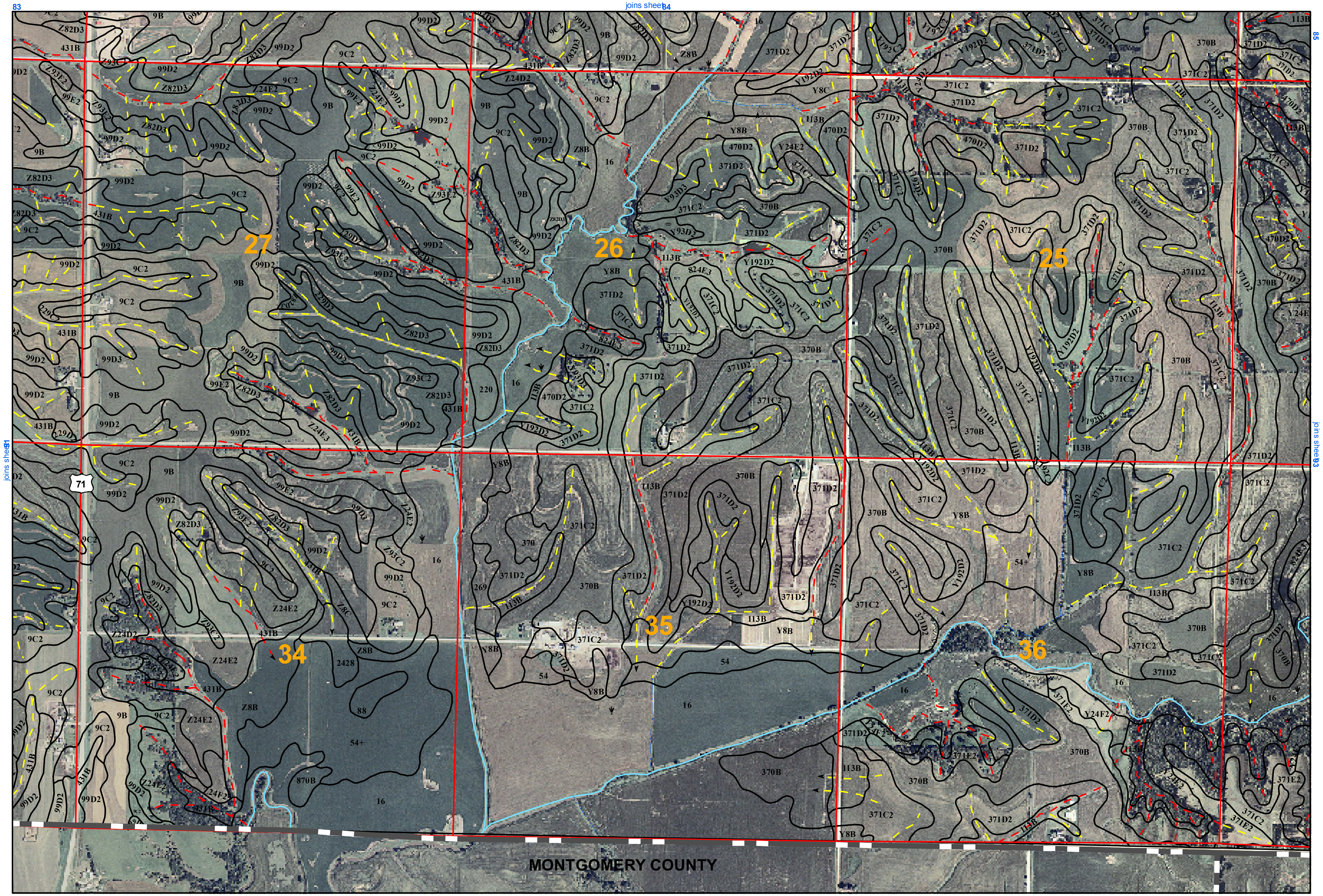
83
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MONTGOMERY COUNTY

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Township 74N Range 35W

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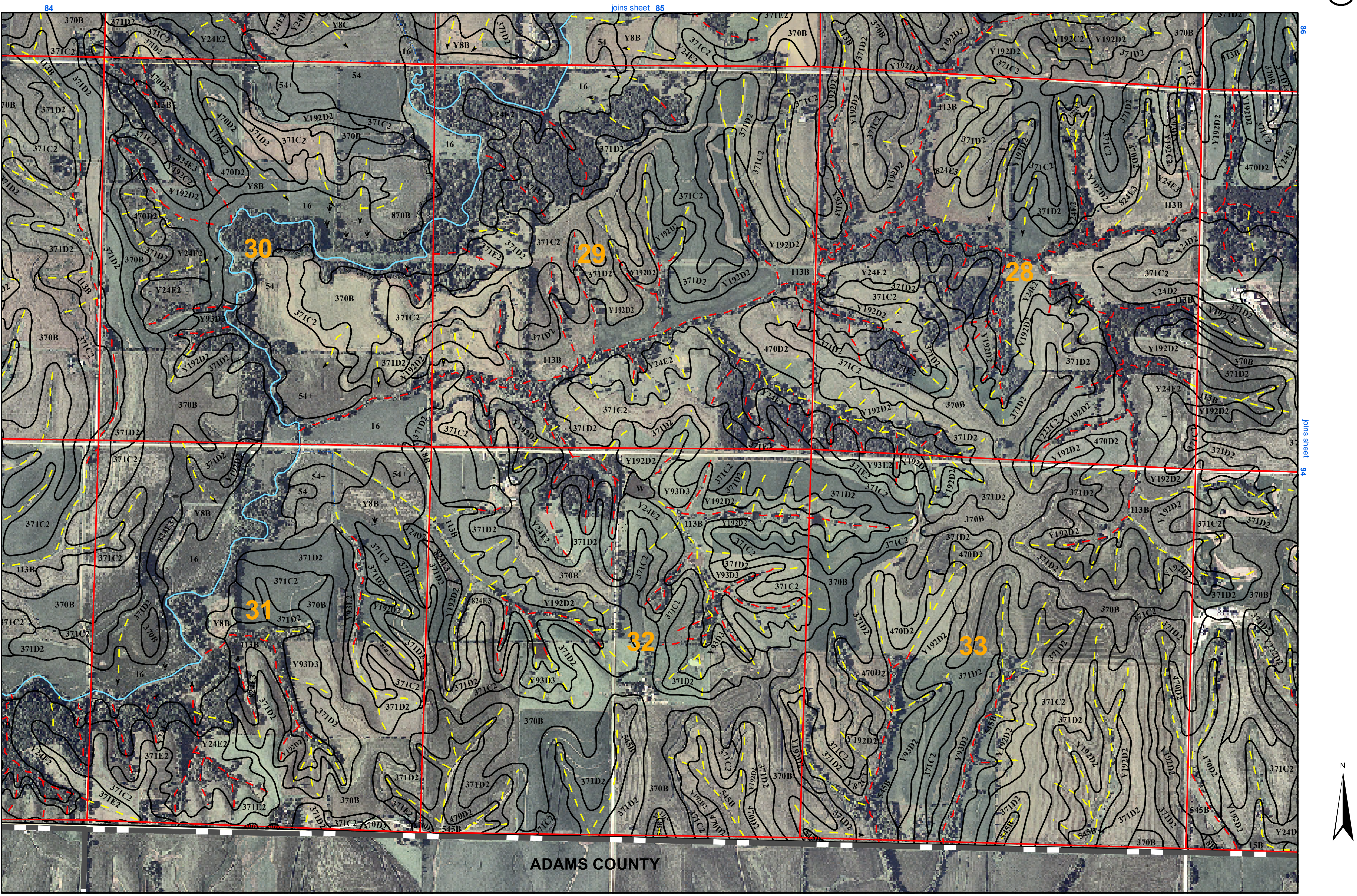
84
joins sheet 85
86
joins sheet 92
joins sheet 94
30
29
28
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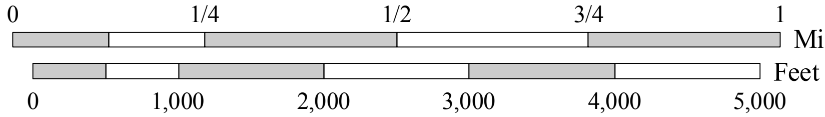
33
ADAMS COUNTY
N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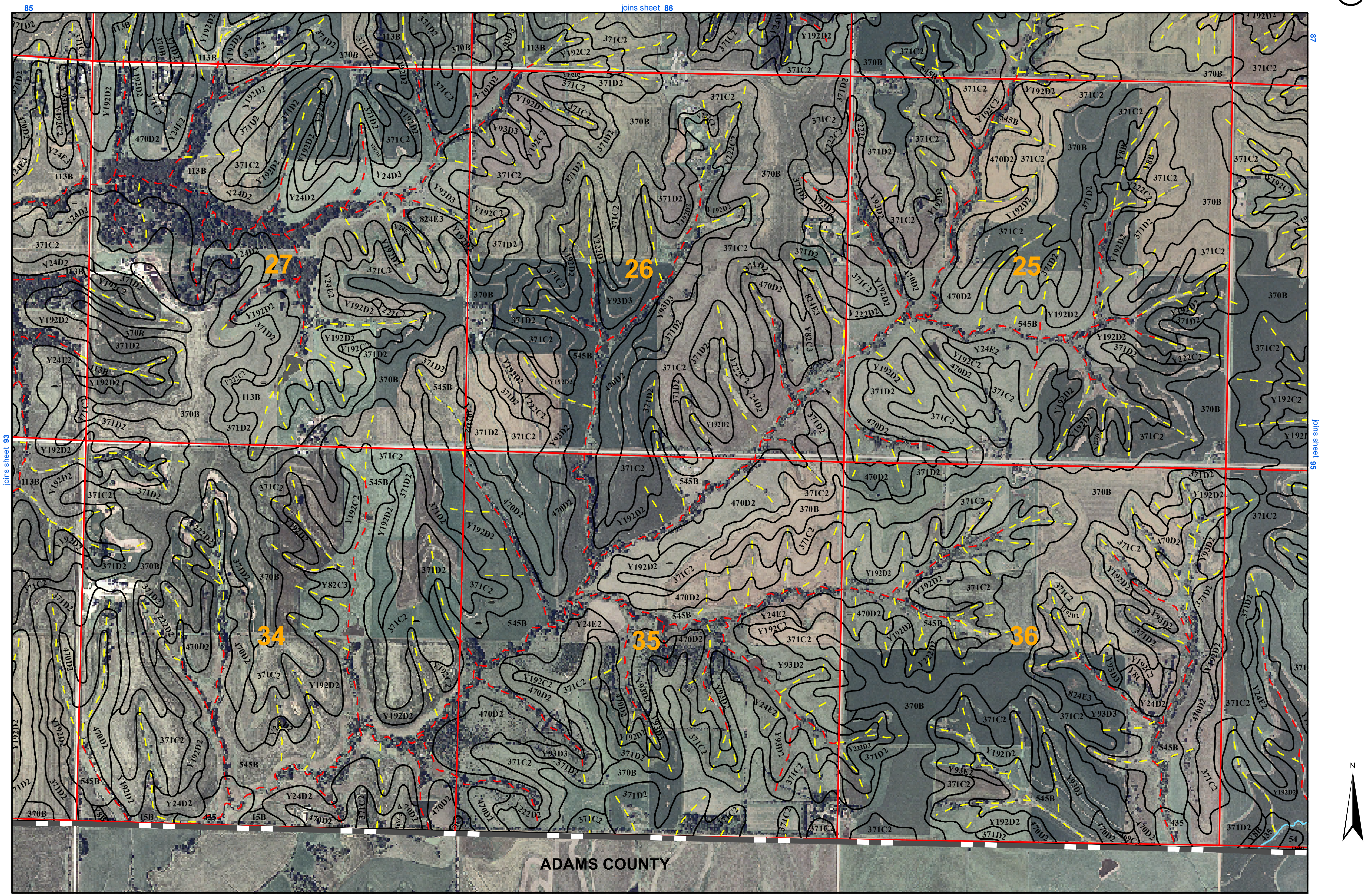
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.


85
joins sheet 86
87
joins sheet 93
joins sheet 95
27
26
25
34
35
36
ADAMS COUNTY
N
370B
371C2
371D2
Y192D2
113B
470D2
545B
Y24D2
Y93D3
824E3
Y24E2
Y222C2
Y82C3
435
15B
54

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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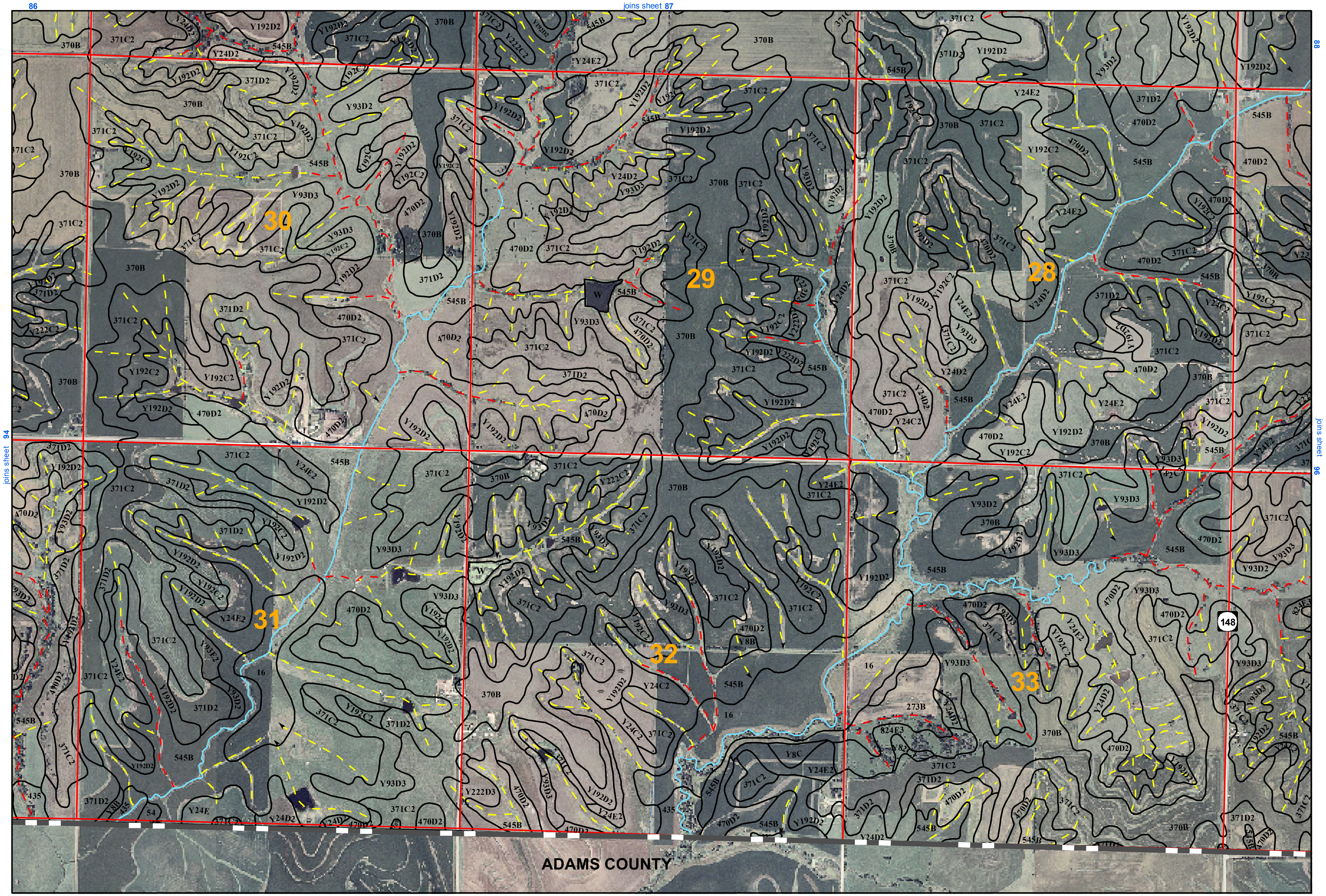
NRCS Natural Resources Conservation Service

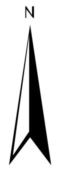
Township 74N Range 34W

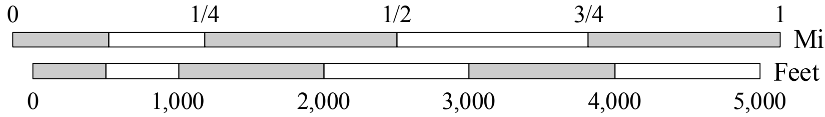
Soil Survey of Cass County, Iowa

This map was prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service using a revised version of the February 10, 2011 Cass County, Iowa SSURGO certified database. The soils and hydrography were compiled to spring 2007 imagery of the National Digital Orthophotography Program (NDOP) and being displayed on summer 2007 imagery of the National Agricultural Inventory Project (NAIP).

North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.


86
joins sheet 87
88
joins sheet 94
joins sheet 96
30
29
28
31
32
33
148
W
ADAMS COUNTY




0
1/4
1/2
3/4
1
Miles
Feet
0
1,000
2,000
3,000
4,000
5,000

Visit the online Web Soil Survey at http://websoilsurvey.nrcs.usda.gov
for official and current USDA soil information as viewable maps and tables.
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SSURGO certified soil tabular and spatial data.

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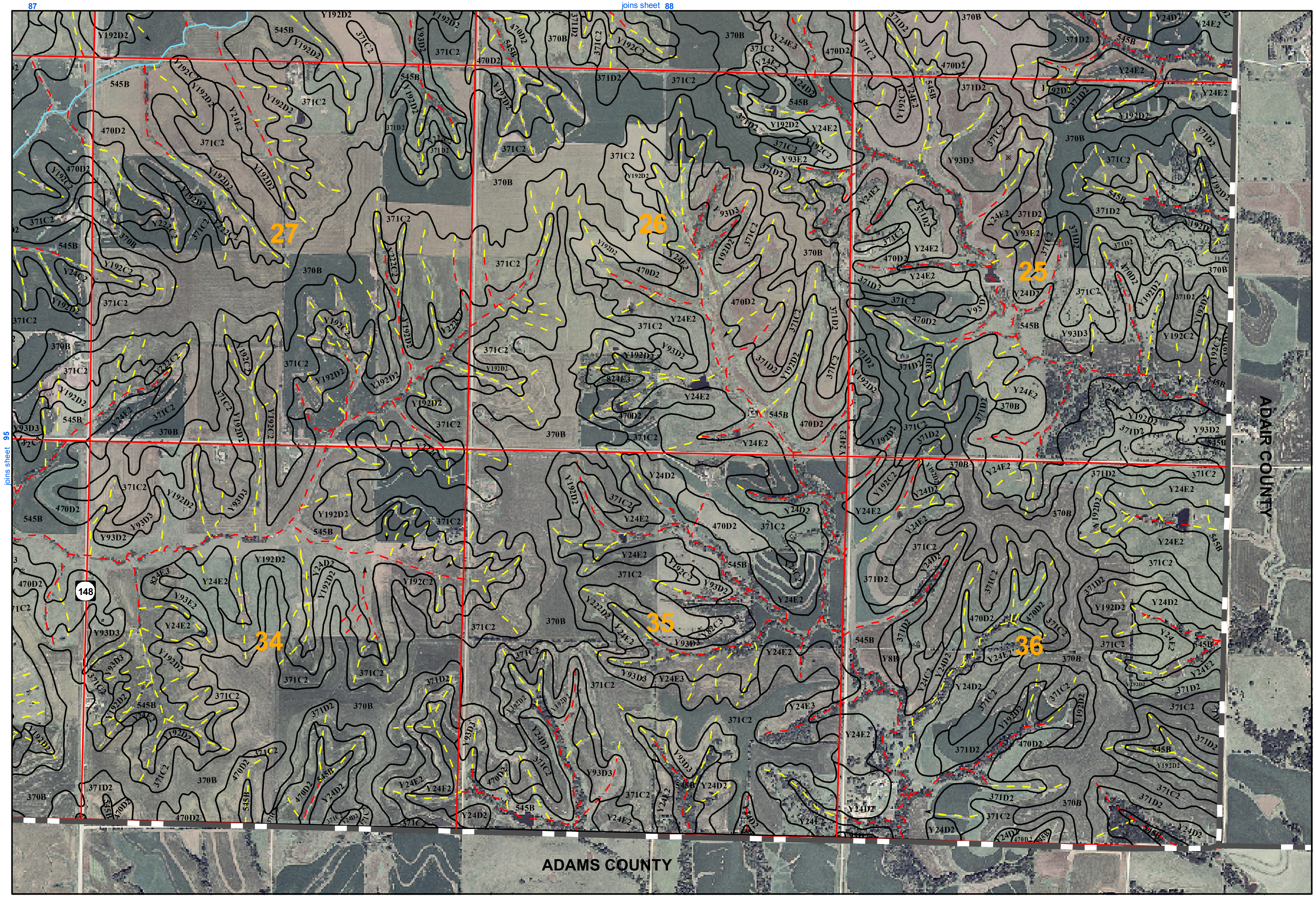
87
joins sheet 88
joins sheet 95
27
26
25
34
35
36
ADAIR COUNTY
ADAMS COUNTY
148
N
370B
371C2
371D2
470D2
545B
Y192C2
Y192D2
Y24D2
Y24E2
Y24E3
Y93D2
Y93D3
Y93E2
Y22C2
Y22D2
Y8B
824E3
93D2

0	1/4	1/2	3/4	1 Miles

0	1,000	2,000	3,000	4,000	5,000 Feet

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